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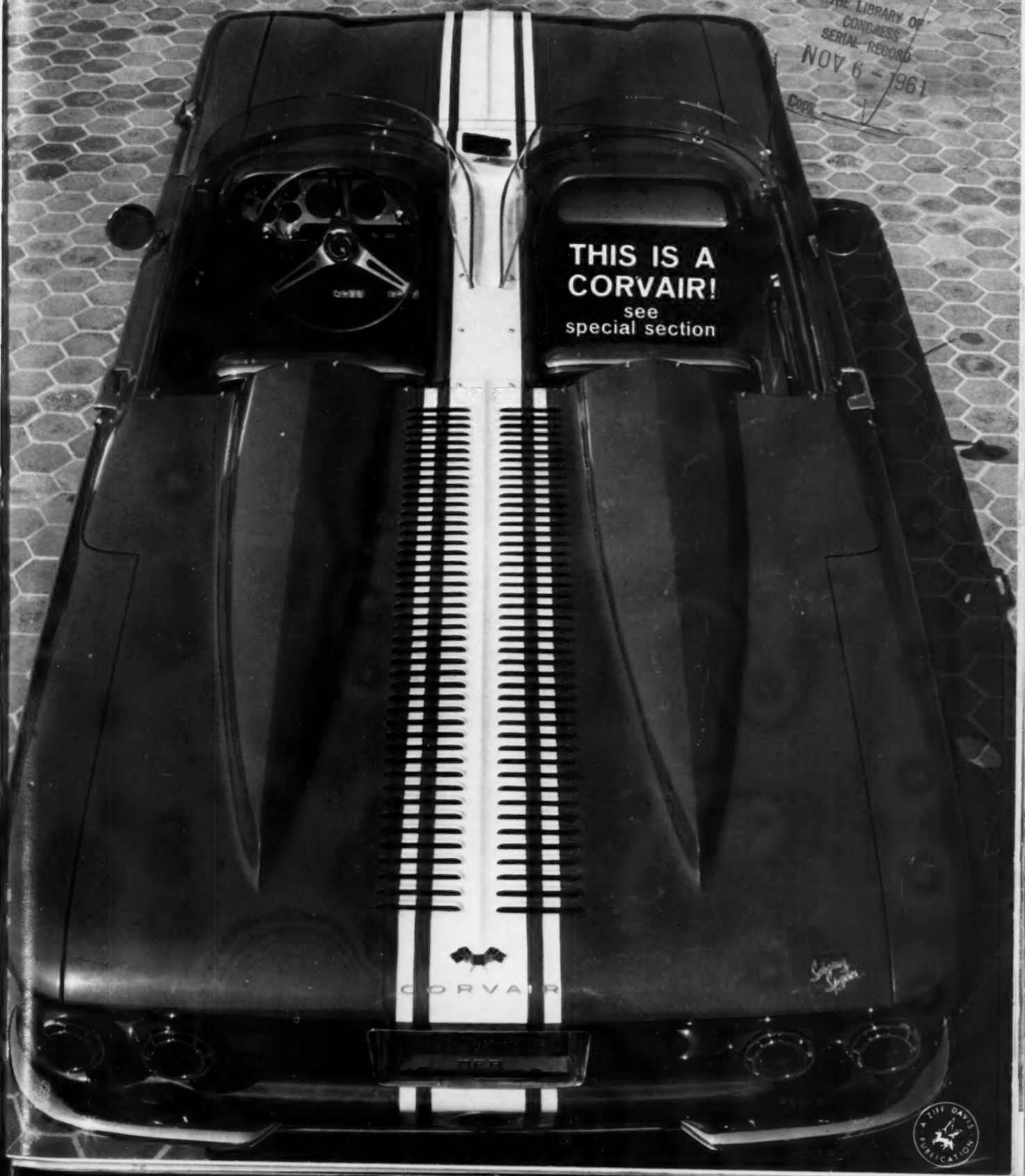

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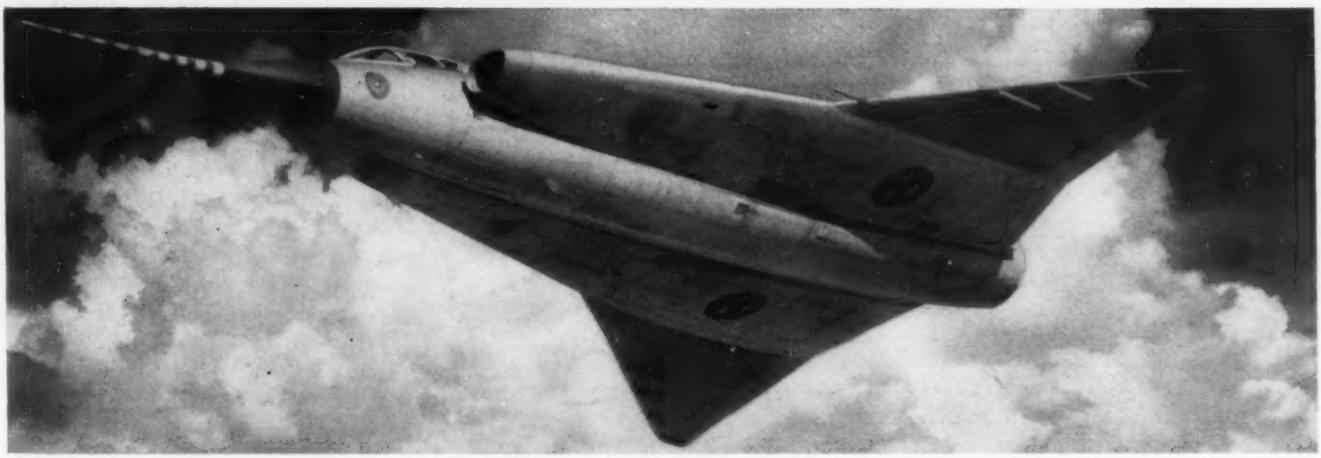

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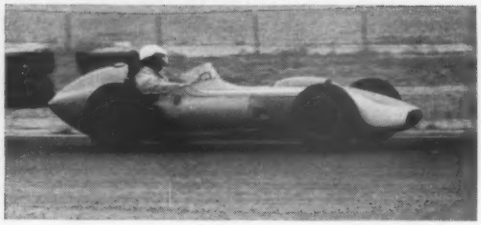

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THIS MONTH'S COVER: To add a touch of spice to the Corvair scene General Motors Styling produced this shortened, and lidless blown Monza.

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*Practical Luxury: The Rover 3-Litre at $5180, U.S. East Coast Port of Entry

The Ideal Automobile?

Mr. Ken Purdy, author, and ranking authority on high performance motor cars, makes this observation:

"Automobiles can be built to satisfy many purposes. They can be made superlatively fast, to offer speeds in the range 120 to 160 miles an hour. Such cars will be very exciting and their engines will be fussy, delicate, and expensive to maintain. They can be made to be superlatively luxurious, in which case their prices will start at $10,000. They can be built to be artificially stylish, in which case they will be hopelessly out-of-date eighteen months later. They can be built to offer rock-bottom economy and they will be uncomfortable and limited in utility.

"The ideal automobile would combine these factors to produce a fast, luxurious, conservatively styled car offering cheap maintenance and low fuel consumption. Of the very many automobile manufacturers who have attempted this synthesis, Rover has probably succeeded best."

In its standards of engineering, material and workmanship there are no compromises in the specifications of a Rover. It is designed to give many years of low-cost, trouble-free operation. It is commonplace for Rover owners to enjoy their cars eight, ten years and longer.

The Rover is exceptionally silent and smooth running. Some idea of the quality of Rover performance may be established by the fact that the car to which the Rover is most frequently compared is priced at upwards of ten thousand dollars more.

There are two Rover sedans. The Rover "100" and the Rover 3-Litre.

The Rover 3-Litre was awarded the gold medal for best coachwork in its class at London's Earls Court Automobile Show in 1959. It is available with fully automatic transmission and power steering.*

The Rover "100" is the latest version of the classic P-4 series, first introduced in 1948, and embodies thirteen years of continuous refinement. It is available with four-speed manual shift and Laycock de Normanville overdrive.† Both Rovers are powered by a seven main bearing crankshaft, six-cylinder engine of exclusive design, and are equipped with front wheel disc brakes.

Since the introduction of the first Rover car in 1904, many prominent British families have owned no other make. The reasons for this loyalty are perhaps not superficially apparent; only by driving a Rover can one begin to appreciate the Rover's remarkable silence, smoothness and comfort, and the general feeling of well-being that this car traditionally imparts. To acquaint you with the many satisfactions of Rover ownership, your Rover dealer or Rover branch office will be happy to make arrangements for a Rover car to be placed at your disposal for a suitable trial period. European delivery may be arranged through your Rover dealer or through the offices of the company.
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Authorized Rover sales and service: **Arizona:** Bogard GMC Co., Inc., 2626 S. 4th Ave., Tucson. **California:** Satori, Inc., 143 S. Glendale Ave., Glendale; Nevco, Inc., 20519 Mission Blvd., Hayward; Peter Satori of California, 325 W. Colorado St., Pasadena; Executive Motors, Inc., 1255 California St., San Francisco; Bliss Automotive Service, 1585 W. San Carlos St., San Jose; Peter Satori (S.B.) Inc., 418 State St., Santa Barbara; Carbrey Motors, 1550 S. Main St., Willits. **Connecticut:** Imported Cars of Greenwich (a Division of Greenwich Auto Repair), 240 Mason St., Greenwich; Nelke Motor Company, 226 Whalley Ave., New Haven; Hackett Imported Cars, 615 Riverside Ave., Westport. **District of Columbia:** Flood Pontiac Co., 4221 Connecticut Ave., Washington. **Georgia:** Richards Motor Co., 5115 Montgomery St., Savannah. **Illinois:** Imperial Motors, Inc., 721 Greenbay Rd., Wilmette. **Maryland:** Foreign Motors, Ltd., 1001 Cathedral St., Baltimore. **Massachusetts:** Naumkeag Auto Sales Inc., 4 Colon St., Beverly; Britannic Motors, Ltd., 1033 Commonwealth Ave., Boston. **Minnesota:** Mark Doyne's Imported Motors, 3038 Hennepin Ave., Minneapolis. **New Hampshire:** Resnick Motors, Inc., 1569 Elm St., Manchester. **New Jersey:** Stillman & Hoag, Inc. Grand Ave. at Route 4, Englewood; Lloyd Buick Co., 300 St. George Ave. East, Linden; Parisian Motor Car Co., 169 Washington St., Morristown. **New Mexico:** Roswell Imported Cars, 1801 S.E. Main St., Roswell. **New York:** Autoland, Inc., 1065-1081 Main St., Buffalo; North Country Motors, 790 Northern Blvd., Great Neck; Stock Motors, Inc., 550 New York Ave., Huntington; Nemet Motors, 153rd St. & Hillside Ave., Jamaica; City Buick, Inc., 3611 Northern Blvd., Long Island City; Vintage Car Store, Inc., 93-95 S. Broadway, Nyack; Finley Motors, 961 N. Genesee St., Syracuse; Sidney-Elliot, Inc., 421 Columbia St., Utica; Jim Forno's Continental Motors, Vestal Parkway East, Vestal; Trotter Equipment Co., Outer Washington St., Watertown; Foreign Cars of Westchester, 25 Martine Ave., White Plains. **Ohio:** Salter Auto Imports, 16222 Chagrin Blvd., Shaker Heights. **Oregon:** British Motors Ltd., 11295 S. W. Canyon Rd., Beaverton. **Pennsylvania:** Valley Foreign Cars, Inc. 344-46 N. 7th St., Allentown; Speedcraft Bala, Inc., 345 Montgomery Ave., Bala-Cynwyd; Olmetti Motors, Inc., 215 E. Pittsburgh St., Greensburg; Nick Ciliberti of Kutztown, 601 E. Main St., Kutztown; Berry Bros. Buick, Inc., 3908 N. Broad St., Philadelphia; Ascot Imported Cars, 604 Beaver St., Sewickley. **Rhode Island:** Competition Engineering, 160 E. Main Rd., Middletown. **Virginia:** European Motors, 6858 N. Fairfax Dr., Arlington. **Washington:** Jaremko Motors, N. 2020 Monroe, Spokane. **Wisconsin:** Milrace Motors, Ltd., 122 Green Bay Rd., Thiensville. **Wyoming:** Haladay Motors, Inc., 500 Block E. 16th St., Cheyenne.

†Practical Luxury: The Rover "100" at $3595, U.S. East Coast Port of Entry

"Gus" Andrey took SCCA Championship and N. Y. Times "Driver of The Year" award for Class D Modified in 1960.

Andrey drove "Birdcage" Maserati to victory for Maser Racing Corp. Oilzum lubrication was part of its careful preparation.

GASTON ANDREY: Driver of the year ...OILZUM user for 7 years

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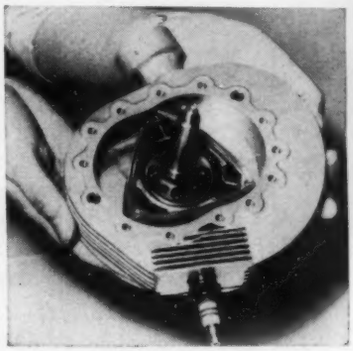
CRASHBOX

with

Karl Ludvigsen

ROTARY RIDE—After nearly two years of studying and writing about the Wankel engine, I finally had a chance to ride in a Wankel-powered car. It was one of a half-dozen NSU Sport-Prinzes that are mobile test-beds for the 400 cc engine NSU is developing essentially for automotive use. After a tour through the new exclusively-Wankel development labs in Neckarsulm, I was seated in a red Prinz coupe alongside a test driver who brought the engine to whirring life. It idled at 1200 rpm, higher than the latest engines which run down to 800 rpm, but still quite acceptable. It accelerated smoothly and strongly without notable flat spots to 700 rpm in the gears, past its power peak of 50 bhp at 6000. Running oil and water temperatures were 105°C and 80°C respectively. With a relatively open exhaust this wasn't a silent installation, but most of the noise came from the pipe and little from the engine room.

NSU's latest approach to the problem of housing manufacture for the 400 cc engine is employment of the "transplant method" developed by Doehler-Jarvis for use only with high-pressure die casting. With this system an internal die to the shape of the epitrochoidal running surface would be sprayed with iron, which would form a liner for the aluminum housing which would then be die-cast around it. When the housing is withdrawn from the die the liner comes right along with it, attached by a mechanical bond and requiring a minimum of final machining. Development of the 400 cc unit also includes creation of a small round radiator to match the engine's shape!

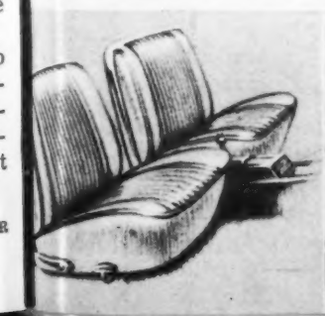


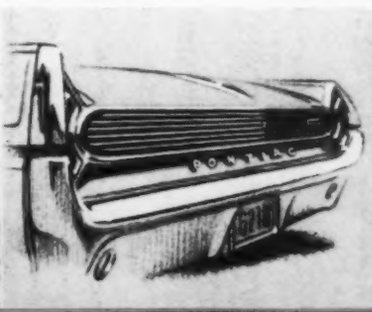
At NSU I also saw a neat little 150 cc Wankel engine about the size of a coffee can, attached to a dynamotor of similar size to make a handful of powerplant that can produce 25 horsepower. Its water-cooled housing is entirely cast iron with the water jacket cast open and covered by an aluminum strip that is *glued* in place! Just as intriguing is the little 60 cc air-cooled engine shown here. Ideal for NSU's scooters, it delivers between 5 and 10 bhp depending on peak revs. All this activity at Neckarsulm is equaled by that behind closed doors at Untertürkheim, where Daimler-Benz is evaluating larger versions of the engine. The current opinion of engineering director Nallinger: "It will be three to five years before we can decide whether or not to proceed with production of a Wankel engine."

THE SPIRIT OF 366—This month's lead article by Sports Editor Herb Williamson opens the gates on a new and tremendously exciting kind of racing that can happen now, today. At this moment there are enough Formula 366 cars booming around this continent to form the nucleus of a fine starting field. There's Hap Sharp's G.P. Cooper and Jim Hall's G.P. Lotus, plus Pete Lovely's Cooper-Ferrari. There's the CERV-1 (we'd hope), the single-seater Sadler-Chevy, and the 250F Maseratis of Phil Cade and Camoradi—remember the latter were talking a long time ago of installing a Chevy engine? Newt Davis just bought the Maser-engined Tec-Mec that ran at Sebring in 1959, a race that also included an advanced G.P. Connaught that's still in this country. Reventlow Automobiles could draw from the Scarab-Chevy (see page 21) and the Intercontinental Scarab-Offy.

That'd be just a start. With Birdcage Masers and Lotus Nineteens to mix in the first few events, plus possible entries from Argentina and Australia, Formula 366 can be a swinging reality as soon as organizers recognize its potential. We believe they're beginning to already, and we're confident you'll support them if and when events for 366 are run in your part of the country. If you know an organizer, be sure to tell him so!

CONTAGIOUS NEW "CUSTOM" FROM PONTIAC! Coming out of the chute or going in for show, your sharpest entry for '62 is the Grand Prix! From a quarter mile off you can see it's one of a kind. Special grille and rear trim treatment set it apart. There's a minimum of brightwork. And that "channeled" look is real. (The Grand Prix sits a full inch lower.) A long, low whistle describes the interior. Five solid colors. High-wing buckets to make you feel like you belong. The console can take either Hydra-Matic or 4-speed stick shift controls (extra-cost options). (Also holds the standard "tach", so you can watch the engine wind.) Standard "G.P." engine is the fabulous 303 h.p. Trophy V-8 with four barrel carburetor and duals. Cam, lifters and special performance axle to match. There's no match for this one. Get close to a Grand Prix soon at your Pontiac dealer's. Pontiac Motor Division • General Motors Corporation.





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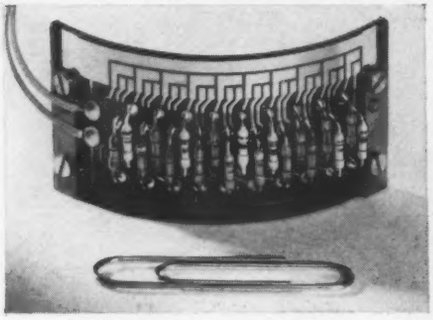

Why are there 19 electrical resistors in the New fully automatic

FUJICA 35EE?

Shown here in actual size is one of the reasons why you can be sure of correct exposure in every picture you take with the new *FUJICA*. Instead of having gears or cams that might be affected by temperature change or physical shock, there are 19 electrical resistors. These control the infinitely small electrical impulses generated by light that hits the electric eye... to open up or close down the lens opening AUTOMATICALLY.

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LETTERS with Sandy Kalison

THE GOLDEN ERA

Your farewell to the Ferrari front-engined G.P. car made me, and many others who look back in anger at the passing of one of the two great eras of race cars, damn near wish we had no F.I.A. The new small cars may make our future sedans better, but I'd prefer to watch a Ferrari, Vanwall, B.R.M. and 250F Maser battle it out. I'm still interested in who wins but I'd rather read about Fangio in the Maser at the 'Ring than von Trips at Zandvoort.

People have said the golden era of road racing was the years that Mercedes and Auto Union were blasting their way to success, but I think it was too limited then. These two cars were the only ones capable of beating each other and even they were inspired by Hitler and his fanaticism. No, I feel the real golden era was run from 1955 to 1960 when competing makes were all capable of winning.

Who will ever forget the sleek good looks of the 250F, the brutishness of the Lancia D-50s and indeed all the later Ferraris and the strangeness of the Vanwall designs? Not I.

Edward B. Swain
Doylestown, Pennsylvania

SPRITE SUGGESTIONS

After having read your Road Research Report on the Austin-Healey Sprite, I would like to thank you for some really interesting reading. I have read other reports on the car, but they have never considered the owner-driver, just the car itself. Your report covered most everything that I and, I expect, many other Sprite owners have discovered—for example the door latch pin snagging the pocket, much to my wife's annoyance.

I have discovered two points which I should like to pass on. You mentioned the direction signal light being blinding at night. Where this was concerned, I solved two problems in one. I removed the indicator light and after cutting a larger hole installed an ammeter to give me a more accurate view of the charging rate, plus a little extra finish at that end of the dashboard. I then cut a ¾-inch hole next to the direction signal switch and reinstalled the indicator light. It does not blind me any more but I can catch the winking out of the corner of my eye.

The radiator overflow pipe ends just above the chassis and when water flows from it it runs onto the chassis itself and could eventually do some damage. The remedy was simple. I just extended the pipe below the chassis. Although this seems simple I was quite surprised at the number of owners who never noticed the rust just below the overflow pipe.

J. Gardner
70 Northbrooks
Harlow, Essex
England

ATTENDANTS OF THE WORLD, ARISE

Since a spoof is supposed to represent a humorous exaggeration of a prevalent situation, James Coyle's "Service With a Smirk" in the August C/D completely misses the mark. He "exaggerates" the almost non-existent, and isn't funny in the process.

It is most amazing that station personnel do welcome and service imported and sports cars—because most of these cars are first-class losers from a business standpoint. Just consider this case: a sports car owner pulls into a station and generously agrees to a fill-up. His tank takes six gallons of gas (and don't worry about that half-cent of spilled gas; it's probably because of inadequate flow capacity of many foreign car tanks.)

On the gas, the dealer makes a gross profit of 18 to 36 cents, depending on the competitive situation. His attendant spends three cents for fluid and wiping towel to clean the windshield. Since it costs about $3.50 in overhead per hour for gas pumping (per customer), and the attendant has been out at the island about seven or eight minutes checking the oil, radiator and battery, wiping the windshield and making change or filling out the credit card, we add another 45 cents or so. Thus, the dealer is losing money on the transaction.

Obviously, the dealer can't stay in business very long under this type of setup. Let's say he's lucky enough to find that you're a quart low on oil. If you're a sports car owner, the odds are about 5 to 1 that you'll pull out a can of some special oil—AND THEN ASK HIM TO PUT IT IN. If he finds you're in need of some service, the chances are you'll thank him for telling you, and then proceed to take the work to Pierre's Scientific Imported and Sports Car Tuning.

The automotive service industry is so competitive that few people make a decent living in it. The crux of the matter is this: the motorist can't afford to pay! Saddled with payments for a car he really couldn't afford in the first place, he chisels and haggles with the serviceman. It's amazing he gets as good service as he does.

Paul Weissler
Bronx, New York

. . . We do make mistakes. Everyone does. But it requires quite a few talents to be an attendant. You have to be a mechanic and a lube expert, not just on one make of car, but on all makes, American and imports. On the island you have to be a good listener, and offer advice if asked for.

I have two suggestions for Mr. Coyle: to change stations, or sell his car and take a bus or cab. Chances are we wouldn't consider him an ideal customer anyway.

Dave Carr
Ft. Lauderdale, Florida

Readers across the country came to the defense of the beleaguered service station attendant. A case, perhaps, of the virtuous many suffering through the antics of the still-existent few. . . .

!NEWS!

FORD MOTOR COMPANY SWITCHES TO AUTOLITE

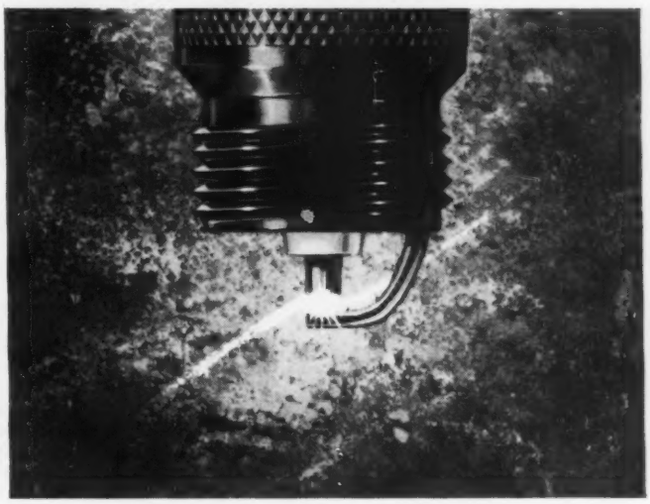
Autolite Spark Plugs are now specified for original equipment installation on every vehicle that rolls off Ford Motor Company assembly lines. And they are strongly recommended by Ford Motor Company engineers for replacement use in all units now in service. Why does Ford Motor Company, like so many other manufacturers, specify Autolite? One of the main reasons is the way Autolite Power Tip actually cleans itself while you drive. See pictures below.

In an Autolite Power Tip spark plug the electrode or firing tip is longer than usual. This tip is made of a special heat resistant alloy. Now, watch what happens.

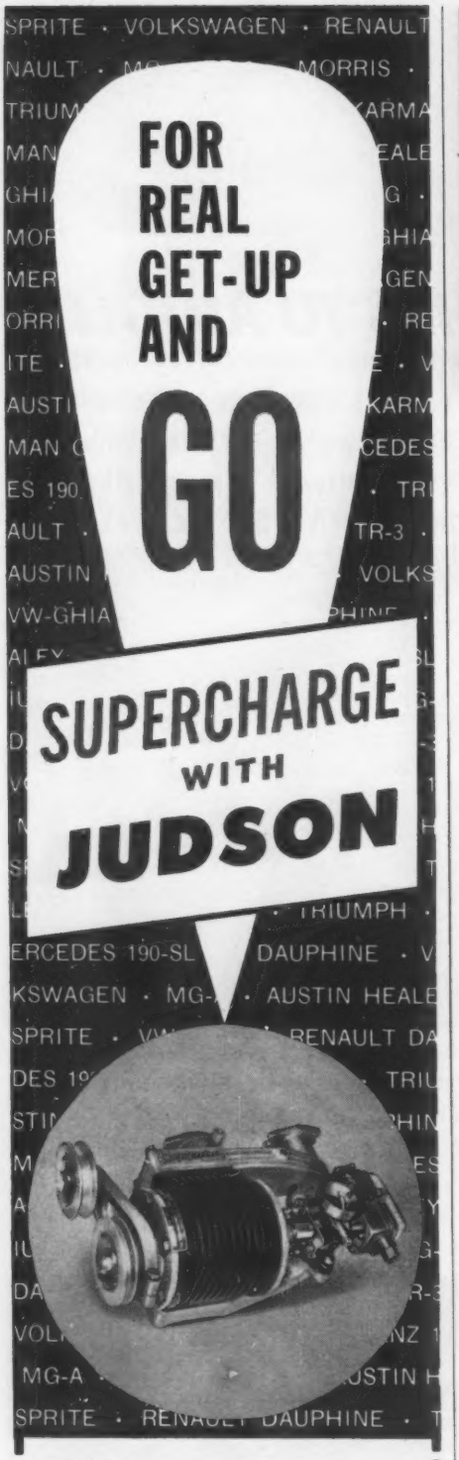
As you drive, lead and other harmful, fouling deposits start to accumulate on the firing tip. If allowed to remain, they will eventually short out and kill the plug.

But the firing tip on an Autolite Power Tip spark plug extends deeper into your engine. Deposits are immersed in the searing heat of the exploding gasoline.

With Power Tip, each time your engine fires, the deposits are actually burned away. Your spark plugs stay clean, your mileage and power stay at their peak.



AUTOLITE SPARK PLUGS
Clean themselves while you drive



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SPORT with Herb Williamson

Last month in the Pipeline column we announced the liberalized racing policy of the SCCA's Board of Directors. We predicted the FIA would rescind its suspension of SCCA drivers and said, "The only question remaining is whether or not the USAC will quietly bow out of the road race picture." We know now it will not.

The latest salvo in the battle of the duplicating machines comes from USAC. Tom Binford, president, announced early in August that USAC's Road Racing Division had been reorganized in a seven-point program as the club sought to assure the running of professional events, preferably under its sponsorship.

Mr. Binford said, "The future of championship closed-circuit racing should not be jeopardized by a sole reliance on cooperative agreements with other organizations. We are most willing to cooperate with amateur clubs, but feel we must rely primarily on our own membership."

The USAC directive, which is in fact almost a restatement of the club's road race aims, allows amateurs to compete with the pros if they are qualified drivers. It rejects the idea of an amateur division as such but, "if he [an amateur] wishes not to accept money and maintain his 'amateur status' we will be happy to cooperate by certifying as to the refusal of prize money." USAC also vowed cooperation with "regional amateur clubs" wishing to stage preliminary events prior to a Sunday of pro races but said this would be a separate sanction between the track owner and the amateur club.

For the start (the plans are not expected to be implemented until the 1962 season—the same as the SCCA's), USAC will concentrate on big-bore sports cars and Formula equipment (Juniors, Formula Libre and, we would hope, Formula 366!)

All of the USAC events will be run under full FIA regulations in hopes of attracting expanded fields of foreign entrants and qualified amateurs. It remains now to be seen whether USAC or SCCA will win in the possible power grab to control United States racing. Both have virtually identical policies. SCCA will run essentially amateur events, permitting pros to run and making no restrictions on any financial agreements its drivers may make. It won't serve as a promoter, however. USAC will run what will be essentially professional races but will permit qualified amateurs (presumably those with National SCCA licenses) to compete. Both have asserted they will seek FIA approval for major events.

It would appear too that USAC is not at all opposed to being the road racing kingpin in the U.S. Evidence of this is its announcement that there will be "a reduction in driver and sanction fees as a stimulus to a wider membership and a greater number of races."

A footnote must be added to our comments on the FIA, USAC and SCCA. While the question of who is going to run road racing in the U.S. remains undecided, the possibility has been raised that it will be neither of the two clubs mentioned but Jimmy Hoffa and his Teamsters Union!

According to NATIONAL SPEED SPORT NEWS, some top stock car drivers have met with union officers in Chicago to form a union of professional drivers, "cutting across NASCAR, USAC, IMCA and other boundaries." The driver contingent was reportedly headed by Curtis Turner and "Fireball" Roberts. The weekly paper said the union, if organized, would be known as the Federation of Professional Athletes. It said Turner had been quoted as saying "A great majority of drivers on the Grand National Circuit have signed applications and paid initiation fees of $10 for membership in the federation." Bill France, head of NASCAR, was quoted as saying "No known teamster members can compete in a NASCAR race, and if this isn't tough enough, I'll use a pistol to enforce it. I have a pistol and I know how to use it. I've used it before. I'm barring union members from races to protect drivers who do not sign up." France reportedly said that "before I have this union stuffed down my throat, I will plow up my 2½ mile track at Daytona Beach and plant corn in the infield."

COMING EVENTS

September		
30	SCCA Divisional Race	Del Mar, Calif.
30-Oct. 1	SCCA Divisional Race	Meadowdale
October		
4-8	Auto International Exhibit	Santa Monica, Calif.
6-8	SCCA Rally	St. Louis Region
	SCCA Rally	New York Region
7	LISCA Races	Lime Rock, Conn.
7-8	SCCA Divisional Race	Vineland, N.J.
7-8	United States Grand Prix	
8	Australian Grand Prix	Watkins Glen, N.Y.
13-15	SCCA Rally	Indianapolis Region
14-15	SCCA Divisional Race	Middle Georgia Region
14-15	SCCA Divisional Race (Rain Date Nov. 4 and 5)	Thompson, Conn.
15-17	Professional Races	Riverside, Calif.
20-22	Pacific Grand Prix	Laguna Seca, Calif.
21	SCCA Regional Races	Lime Rock, Conn.
22	12-Hour Little Le Mans	Marlboro, Md.
28-29	SCCA Divisional Races	Dothan, Ala.
November		
11-12	SCCA Divisional Races	Marlboro, Md.
21-26	Imported Car Show	San Francisco, Calif.
25-26	SCCA Divisional Race	Phoenix, Ariz.
25-26	SCCA Hillclimb	Chimney Rock
27-Dec. 2	Bahamas Speed Week (Karts)	Nassau
December		
3-10	Bahamas Speed Week (Sports Cars)	Nassau

N.B. Every attempt is made to ensure accuracy in this list; however readers are advised to contact tracks or officials to verify dates.

We attended the classic Giants' Despair hillclimb at Wilkes-Barre, Pennsylvania and saw John Meyer of Long Island drive his Pontiac-powered special to a new record, beating his own fastest time set the year before. The record was also broken by Bud Faust, of Wilkes-Barre, driving his Chevy-powered Ferrari, but he trailed Meyer by a scant 0.891 second for the one-mile climb. Meyer's time was 56.576, one second faster than the old mark. He broke the record on his second try (all of the more than 80 entrants had two runs). On his first, the drop of the starter's flag was also a signal for a cloudburst and he was probably lucky to even make the summit.

Jack Wendt, of Mountaintop, Pennsylvania, shared the driver's seat of the "Lofa" (Alfa-powered Lotus 9) with Dave Adams of the same town. Good looking, it went very well, winning Class F-M.

The October 1 Continental Divide professional race has been cancelled. The DENVER POST, sponsor of the event, is hoping it will be held in 1962.

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The driving position is a very personal matter and one which you must work out for yourself. The main thing is to be comfortable and to have all the essential controls within easy reach.

The current practice on single-seater racing cars is to use a reclining seat with the steering wheel more-or-less upright and at arm's length. It should be possible to adjust the position and rake of the seat to suit the majority of drivers.

The seat should give lateral support right up to shoulder level, and for this reason it should, if possible, be made—or at least padded—to fit an individual driver. It should also be very rigidly mounted, to prevent any possibility of movement when cornering, accelerating or braking.

In addition to being comfortable it is also necessary, on a single-seater, to be able to look over the top of the windscreen without being buffeted by the wind at high speeds. To attain the ideal in this respect it may be necessary to build different windscreens for different drivers.

There is much to be said in favor of the straight arm driving position. It allows the steering wheel to be turned the maximum amount without the arms becoming crossed up. It also permits rapid correction. Racing car steering is so light these days that the leverage of bent elbows is no longer necessary. And I find the straight arm position the most relaxing.

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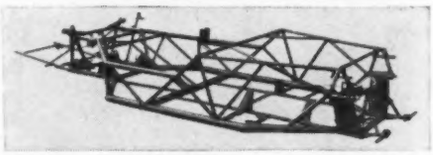
TECHNOTES
with
Jan P. Norbye

IT GOES THATAWAY

You have made a grievous error. On page 29 of the June issue, you show a drawing of a Ferrari space frame. It's our opinion that this frame is not that of the winning (front-engine) car but of the new rear-engined car.

We are sure the four pegs inside the larger section are engine mounts and the rear-engined car also has an exaggerated, raised rear end.

G. R. Hampson
P. S. Smith
Arlington, Massachusetts



We must agree that the frame looks like that of the rear-engined car. We thought it was too at first glance, but more careful study reveals other pertinent facts. For example, if the rear of the frame were to the right, as you suggest, the drive half-shafts to the wheels would have to pass through the very solid boxed pillars which actually support the front suspension.

PERFORMING SIMCA

I have just read "Souping the Small Ones" by Roger Huntington (SCI Directory, 1961). My car is a 1959 Simca Aronde with Flash engine. Top speed is satisfactory but I want more power and thought about trying to raise the power output when I have it overhauled. How much could I increase displacement and how much would this increase bhp and torque?

Hugh Hardison
Lewisburg, Tenn.

The Simca Flash engine has a wide margin for power tuning, and bolt-on parts exist which will give you the desired performance without boring out the cylinders. The best known firms offering such parts are Intermeccanica in Italy and Alexander in Britain. The full Alexander conversion involves raising the compression ratio, enlarging and polishing the ports, shortening the valve guides and fitting stronger valve springs. A special intake manifold with twin balance pipes, two downdraft Solex carburetors and larger exhaust pipes completes the kit. We have not tested the Alexander Simca, but understand from our British correspondents that 0–50 mph acceleration is a matter of 10 seconds, while top speed approaches 100 mph. For further details, write to Alexander Engineering Co. Ltd., Haddenham near Aylesbury, Bucks, England. Intermeccanica parts are available from North-East Engineering Co., Box 153, Turin, Italy.

(Continued on page 89)

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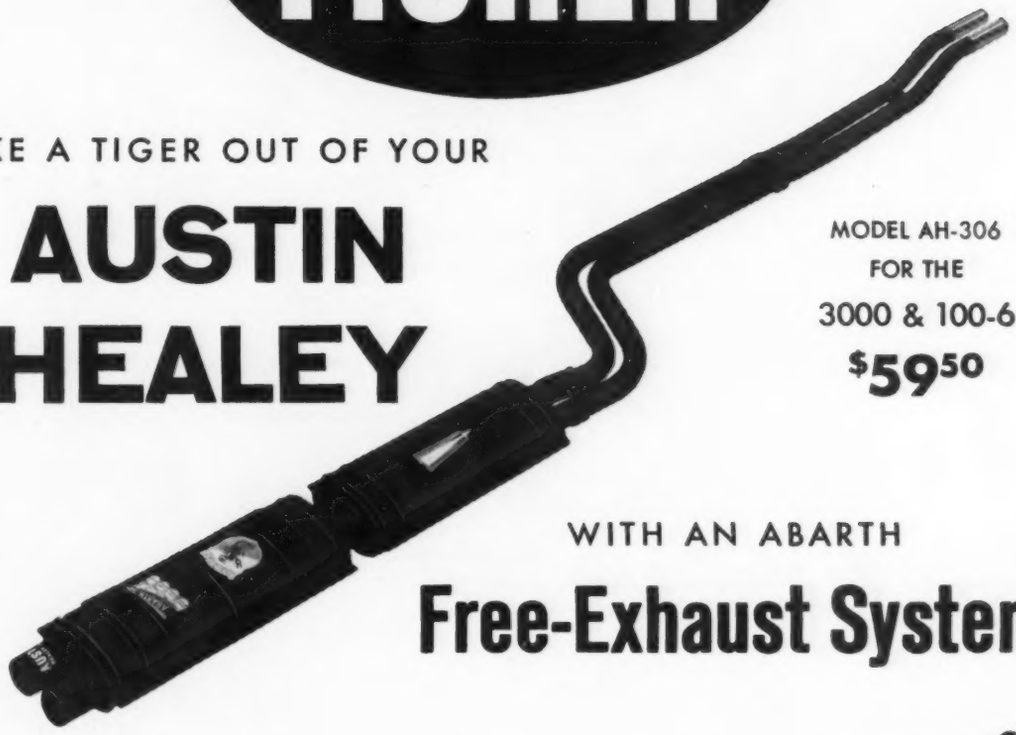

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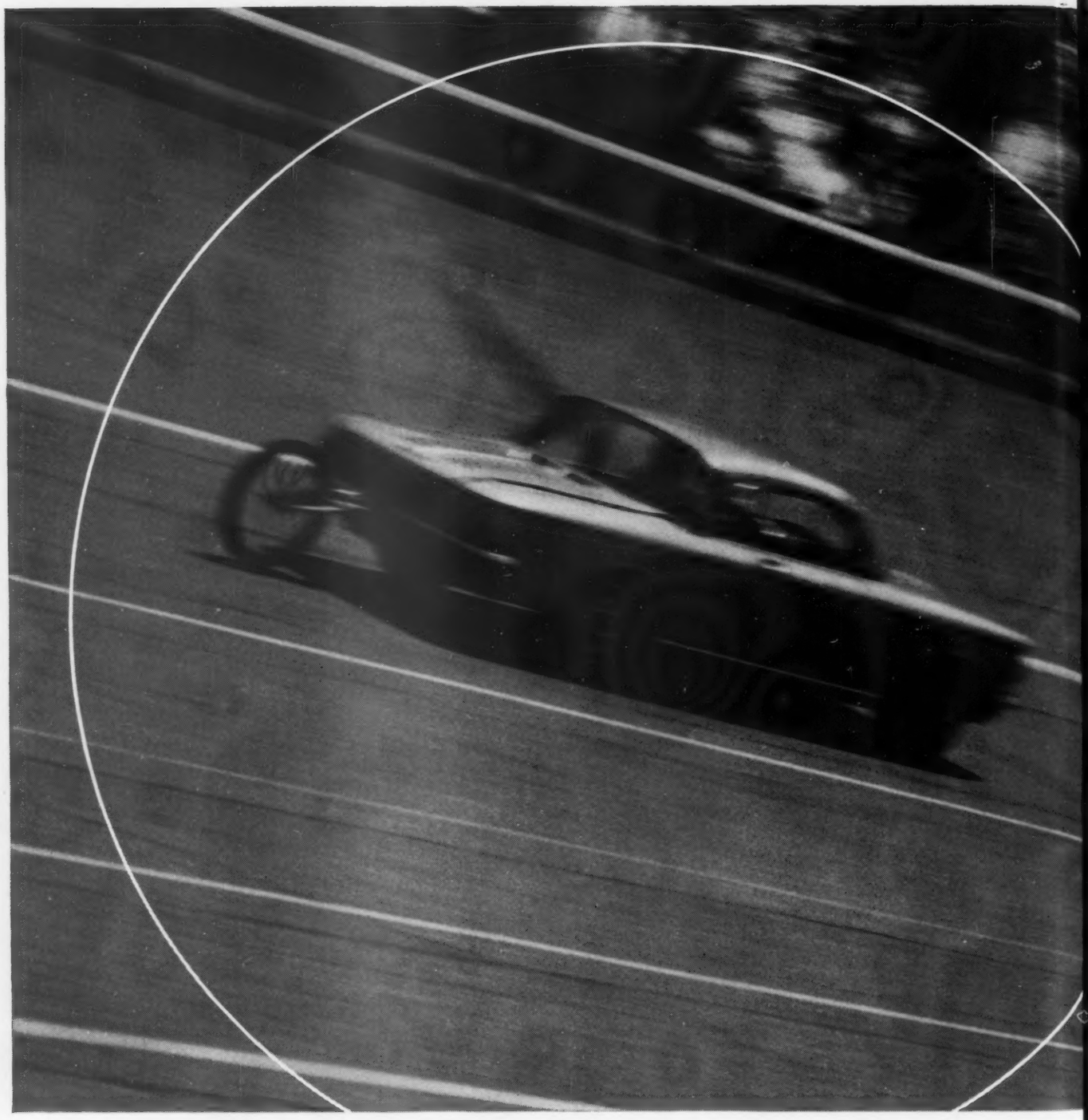

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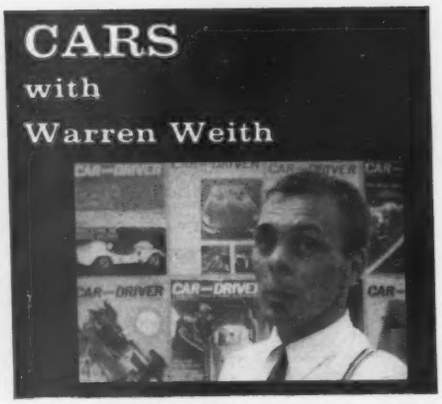
CARS with Warren Weith



We've seen and driven many of the 1962 cars and come away with the impression that American manufacturers are conscientiously striving for product excellence rather than sheer novelty. The highly controversial question of planned obsolescence now seems likely to be decided on the basis of customer desire for a new car rather than compulsion by a general decay of the machinery after a given number of months.

Gimmicks, both in styling and extra or optional equipment, still exist but play their role on a lower key. The general attitude seems to recognize that for most buyers the investment in a car is second in overall expenditure to housing and food. Industry has realized too that while Americans are notorious for their failure to maintain their cars, they do expect trouble-free service and high performance. Consequently, both of these are, to a large degree, being built in, as are economy and mechanical soundness. The trend toward permitting buyers to specify exactly what kinds of cars they want is gaining momentum too, but efforts are being made to simplify the naming of different models to reduce confusion.

The newest of the cars are the Chevy II and the Ford Fairlane (the latter being quite similar to the '62 Mercury Meteor). Both are "senior compacts," a little bigger than the compacts and a little smaller than the "full-size" cars. Their engines are described on page 28. Both offer more performance and creature comforts than the basic compacts.

The compacts include convertibles in the Buick Special, Pontiac Tempest and Olds F-85 lines. Corvair, Falcon-Comet and Valiant-Lancer may follow suit later in the year or with the '63s.

The G.T. kick is showing no signs of diminishing. The Monza, Falcon Futura—S 22, Valiant-Lancer models will feature more optional performance items. We had a chance to sample some on the Lancers and found the performance improvement quite satisfying. As a footnote we should report that we found much less enthusiasm among industry men for the AMA ban on racing; it's quite possible the ban will be lifted in the not-too-distant future.

Plymouth is featuring a whole new body shell, much improved over the 1961's by being cleaner and fleeter. Featuring a flatter roof line (very popular with all manufacturers this year), it's also shorter in overall length. Big, round dials are replacing "styled" instruments of former years and legibility and looks are consequently improved in many of the '62s.

Oldsmobile, as mentioned, will offer an F-85 convertible which will include more room for back seat passengers, a new hood and a restyled front end. The rear end has been updated and a stainless steel rocker panel added. In the mechanical end of the spex, the Cutlass 215-cubic-inch 185-bhp engine will continue as an option. Among the big Oldsmobiles, a

(Continued on page 16)

Rakish Dodge Dart 440 (above), Chevy II four-cylinder sedan in action and the clean Studebaker Hawk interior with the floor-mounted shift are all new for '62.

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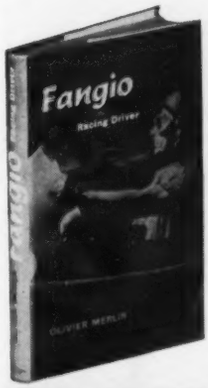

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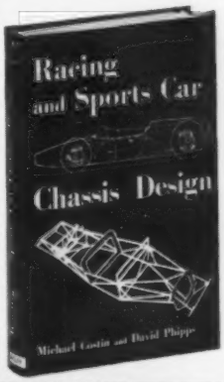

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231 **The Ferrari,** by Hans Tanner, 5½ by 8¾ inches. Not only is this book the long awaited story behind the Ferrari racing successes but it is also an extremely factual & informative work giving technical details & specifications of all the cars that have borne the insignia of the Prancing Horse. The author writes with the authority of first-hand knowledge obtained with the fullest & friendliest co-operation of the "Commendatore" in Modena, & traces the story of his famous marque from its inception in the racing stable of Alfa Romeo. The appendices form **a permanent reference for Ferrari facts & figures.** For years, friends have asked for a technical & general book on the Ferrari. This is it—we are proud to be the publishers of the only book in English on the marque..$5.50

237 **Sports Car Bodywork, Construction in Timber, Metal and Plastics,** by B. W. Locke. The only authoritative book for "special" builders and car restorers. Large fold-out sheets of detailed working drawings, cross referenced with text. "Special" builders & restorers frequently find that the construction of attractive, practical bodywork is the most difficult part of their task. The amateur bodybuilder will save himself much time, trouble & money by careful study of this book, both before and after starting his work. **Chapters:** 1, Design Requirements; 2, Drafting Out Body; 3, Useful Tools; 4, Construction of Timber Framed Bodywork; 6, Panelling and Fittings; 7, Glass-Reinforced Plastics Bodywork; 8, Painting; 9, Multi-Tubular Space Frames. Appendixes $8.50

281 **The Motorist's Weekend Book,** edited by Michael Frostick and Anthony Harding. Many books are claimed to be "something different." This one is. Here you will find essays on subjects ranging from Bugatti to broadcasting, road tests to rallying, love to Le Mans, dicing to dress, poetry to picnics — contributed by the elite of motoring writers. As well as a lot to read, there is also a lot to look at — a fine collection of pictures by some of the best motoring photographers in the world and a selection of cartoons by the inimitable Russell Brockbank and others. You will be sure to find something in this book to entertain you, make you laugh or give you food for thought. A wonderful bedside book for yourself, and the best all-around gift book for any automobile enthusiast..$6.50

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ROLEX GMT-MASTER GETS TOP TESTIMONIAL

from Pan Am Navigator

Pan Am Navigation Pilot Bernard Lorenz flies with a Rolex GMT-Master

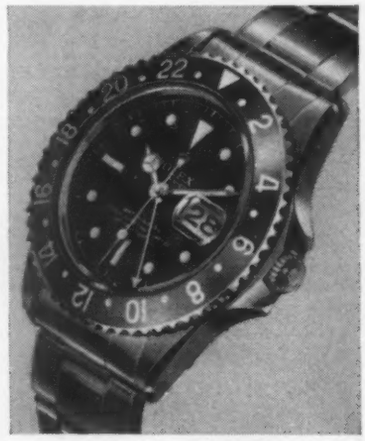
Bernard Lorenz, a Pan American World Airways Navigator, wears a Rolex GMT-Master, the watch that tells the time in any two places on earth at once. He describes its accuracy as "excellent: well within our navigational tolerances."

This top testimonial is due to the high accuracy of the GMT-Master: it is a wrist-*chronometer*, has been subjected to the kind of tests usually applied to large marine chronometers. But its unique feature is that it shows both GMT and local time simultaneously: a revolving 24-hour bezel and a special 24-hour hand make this possible.

"Having GMT available along with local time is a most desirable feature from a navigational standpoint," writes Lorenz. *20 out of 21 airline pilots agree with him.* But not only pilots; any intercontinental traveler would appreciate this watch. Its special features plus automatic winding, automatic calendar, waterproof* case and chronometric accuracy, make it a very special watch indeed.

**With case, crown and crystal intact.*

GMT or local time is read on the main dial. The watch is set to read any other time by means of the rotating bezel and 24-hour hand.



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American Rolex Watch Corp., 580 Fifth Ave., New York, N. Y.

(Continued from page 14)

more linear styling has been adopted. New is the coupe version of the Starfire convertible. Self-adjusting brakes have been incorporated and the three center main bearings have been lengthened for better crankshaft support. Tapered roller bearings have replaced ball-type wheel bearings and a 52-amp alternator replaces the generator in air conditioned cars. Two 394-cubic-inch engines are available, developing 280 and 330 bhp at 4400 and 4600 rpm, respectively.

Studebaker has added its Daytona hardtop and convertible which feature bucket seats, a between-the-seats "console" and optional four-speed floor shift. The grille, rear-end and rear roof support look different. The six-cylinder engine incorporates the following changes: new water pump, relocated breather, new rear engine mount, 8.25-to-one compression ratio, and new clutch housing for an 8½-inch clutch. The V8 also has a new water pump, identical compression ratio as the six, new con rod bearings and shares the six's clutch. The short-wheelbase models have increased a half-inch to 109 inches, with all four-door sedans, Cruiser and station wagons on a 113-inch wheelbase. Cruiser models will feature a wood grain dashboard and Larks will have quad headlights.

The Studebaker Hawk will be offered in a hard-top rather than coupe form. The engine will be the same as in 1961 with compression lowered from 8.8 to 8.5 to one. The rear of the roof has been raised and flattened with the rear window recessed. Simulated wood is used on its dash too.

Lincoln's Continental is pretty much as it was externally but with a different grille and slightly changed rear end. The Continental demonstrates a sentiment that is becoming more apparent in the industry: if you've got a good car, don't change it just for the sake of change. Beneath the skin there is a host of new mechanical details. Most shoppers and buyers wouldn't know they exist but they all seem to add up to increased worth and longevity. Listening to the Lincoln engineers, one came away with the feeling they were determined to make the Continental the best car in the United States.

As with most of the industry, Lincoln is stressing long mileages between service with "permanently" lubricated suspension components and controls that are "greased for life." Lincoln has officially endorsed 6000 mile oil changes (or six months, whichever comes first) for its cars. Other manufacturers are similarly increasing the recommended service cycle (and owner satisfaction).

For the most part, 1962 is a year of improvement rather than sweeping change. The independents, such as American Motors and Studebaker-Packard, are playing it close to their vests, seeking to minimize any market sweep by the big three. Chrysler is facing '62 with a guarded optimism. Management, product lines and dealer reorganization have been backed up with realistic changes in the cars themselves where experience has shown they have been needed.

The familiar forms and specifications of most of the 1961s are continued with subtle styling changes (fins are pretty much out, now) designed to increase product identity and enhance appearance and mechanical improvements have been seeded in. Looked at as a whole, the '62 crop of American cars offers the enthusiast buyer an exciting array. We can only present a sampling here so we'd urge you to check them out at your local dealer.

a great new power mate for the Special's aluminum V-8

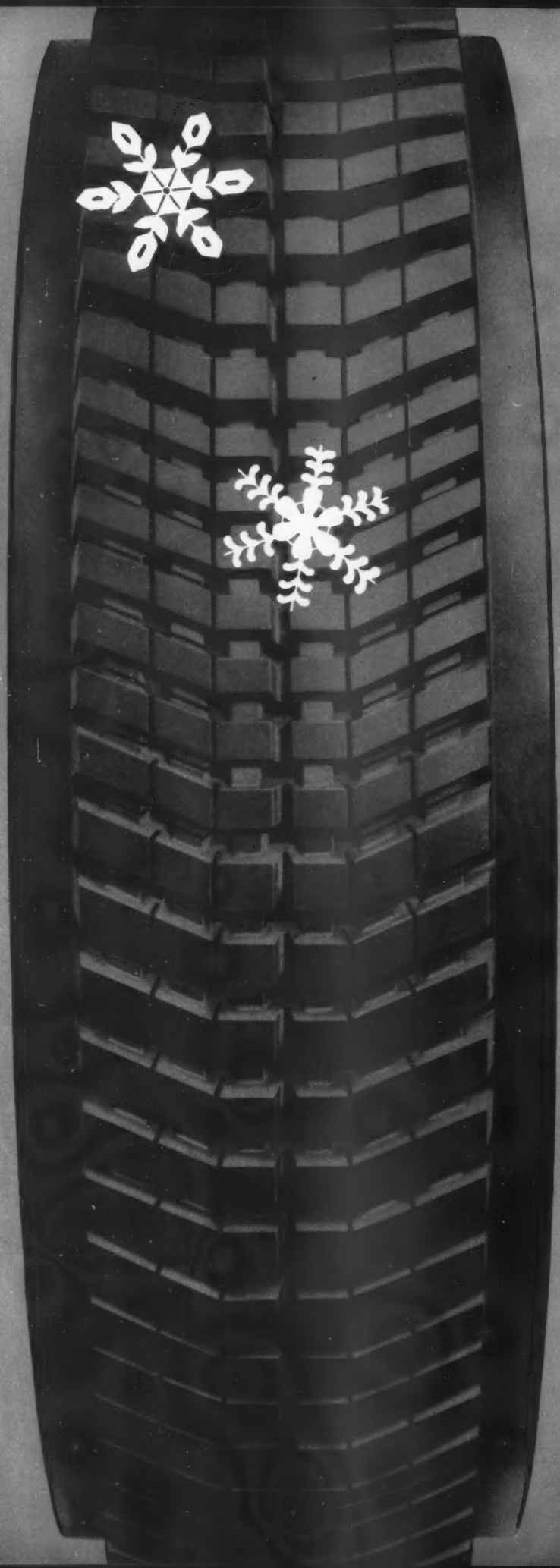
Now a V-6! Only Buick has it!

Six for Savings—V for Voom. It was natural that it came from Buick. Natural that Buick developed the successor to the in-line six-cylinder engine...*the V-6!* A V-6 you can now get in the new 1962 Buick Special (in convertible, sedan or station wagon models). A V-6 that has 140 to 179 pounds less weight than in-line sixes of comparable power. A V-6 that gives you the V-smooth, V-lively *Voom* of big cars *plus* gas economy that challenges the compacts. A V-6 with the shortest, most rigid block and crankshaft in any American 6-cylinder car.

Why is it natural that this great engine should come from Buick? Because it was Buick which also developed an *aluminum V-8* which you can also get in the Buick Special. This is the V-8 that gives you sizzling go, yet swept its class in 1961's Mobilgas Economy Run against the country's top drivers. It's natural that it should come from Buick, too, because so many other great automotive advances *have* . . . such as today's safe, simple directional signals . . . fin-cooled aluminum brakes . . . the first no-shift transmission . . . the first hardtop. So here again you have exciting proof that when better automobiles are built, Buick will build them. Buick Motor Division—General Motors Corporation.

'62 Buick Special V6 V8

The happy-medium size



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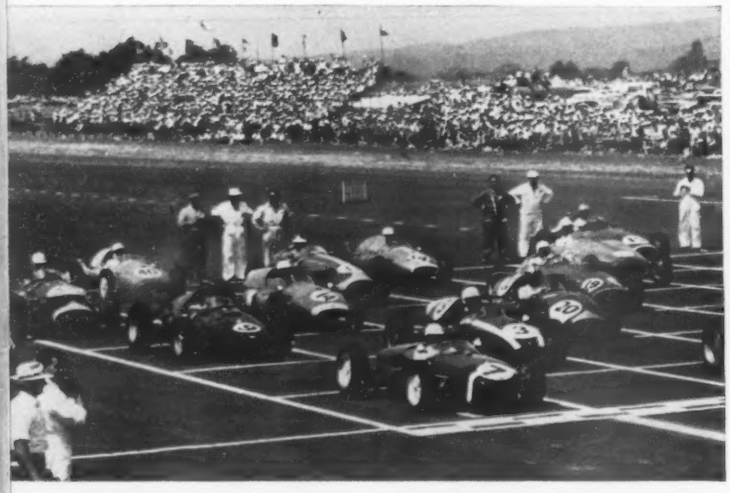
This is the shape of future race cars for a frantic new Formula!

by **HERB WILLIAMSON**

● We call it Formula 366. It developed from informal conversations among the CAR AND DRIVER staff and is based on what we have seen and heard around the world. We realized there were a number of different trends which, if they were distilled, could greatly increase the scope and context of international racing.

The first of the trends is the Intercontinental Formula. Although it has received support in England, it seems to be withering on the vine. For machines up to three liters, cars eligible under the I.F. include all those built for the last Formula 1 as well as a number of Aston Martin, Ferrari and Maserati specials now running in Australia.

A second trend is the building of single-seat road racing cars using big-displacement American V8s. These include the CERV-1, the original rear-engined Sadler Special, and the front-engined Scarab-Chev V8 described elsewhere in this issue, to name three in North America. Similar specials exist in Australia and there are a number of Ferrari-Chevys and Maserati-Chevys running in Argentina.



We're hoping that scenes like this will be repeated at tracks throughout the Americas as Formula 366 events are scheduled.

Further attention is being shown with the running of track-racing sprint cars with stock block engines up to 6 liters or 366 cubic inches. Owners of such cars have gained a lot of experience in extracting power from the stockers and now have equipment that could be easily converted to road race use by the addition of a Corvette transmission and suitable brakes.

Our proposal is that there be created a new single-seat race car formula to unify these efforts. We call it Formula 366. Its specifications would allow:

Racing engines (less than 1000 produced in any 12-month period) up to a displacement of 3 liters or 183 cubic inches.

Production engines (over 1000 produced in any 12-month period) up to a displacement of 6 liters or 366 cubic inches, retaining their original, basic cylinder block and heads and the system of valve actuation (pushrods, overhead cams, etc.) unchanged in principle.

Fuel used would be pump gasoline only and superchargers would be barred.

This was the general theme of a letter we sent recently to 40 of racing's most influential individuals and organizations. The results were, to say the least, gratifying, with many of the receivers showing a real enthusiasm for the plan.

Bill Sadler of Canada and Warren Olson, the managing director of Reventlow Automobiles, Inc., gave unqualified support. Sadler replied, "I would say that if there were two or three good pro races that included this type of car, we would definitely build one ourselves and probably build one or two for customers." Olson referred to the Scarab-Chev, adding "if events are organized for this class we plan to build at least two more. We also hope to be able to market a rear-engine chassis that would fit into this general category."

Driver John Fitch sent his congratulations but questioned the need for any displacement limits. He said he favored the idea of a Formula Libre, picturing it as a self-limiting proposition. In reply, we would point out that a ceiling was placed on the Formula for two reasons. One is to provide the closest possible racing and the second is to create a Formula that does have cohesiveness and is not a vague, indefinable concept as Formula Libre is.

The possibility of the Formula falling apart after a few seasons was raised by George Weaver of Thompson Raceway who pointed out that at Indianapolis in the 1930s stock blocks were allowed, finishing as high as third. "But gradually the true racing engines predominated. The stock engines resulted in heavy, poorly balanced cars in most cases and in skimpy construction in some critical areas." We feel there's little danger of this happening, mainly because present stock engines have more potential and because race car construction methods have improved. The 366-cubic inch formula for Indianapolis placed many other restrictions on design and engine tuning in a misguided effort to minimize costs. This may have led to the poor construction Mr. Weaver cited.

Ray Lavely, of Continental Divide Raceways, questioned the proposed 183-366 cubic inch balance between racing and stock block engines. "I like your idea very, very much. The racing engines may actually be handicapped too much. There is much more spread than in USAC sprint racing, for instance. I believe that 366 needs very evenly matched equipment to be successful and a maximum of cars on the course at all times."

Tom Binford, President of USAC, expressing his own personal opinion, said, "I agree enthusiastically with your idea. In fact this is what we have been working toward for four years with the Intercontinental Formula of three liters. We were, however, thinking in terms of 5½ liters instead of 6, feeling that 366 cubic inches was an exceptional advantage with the advances of stock racing engines expected in the near future."

The high output of three-liter racing engines and cars that would be eligible for 366 was one point we weighed heavily in deciding on the upper stock engine displacement limit. Furthermore, since we are talking about road racing and not track racing the role of light weight, good balance and good braking is stressed over the need for sheer power. Warren Olson pointed out most stock block builders probably wouldn't exceed about 5 liters or 300 cubic inches for the Formula since the extra power couldn't be used effectively. If, as Mr. Binford and Mr. Lavely said, the stock limit is high, we feel it shouldn't be objectionable since it will serve as a realistic ceiling and may encourage more people to build and race cars for the Formula.

Augie Pabst summed up drivers' feelings, "I think your basic idea is very good; (*Continued on page 74*)

DRIVING THE SCARAB-CHEVROLET

by KARL LUDVIGSEN

Want to know what Formula 366 looks like, sounds like, feels like? It's vivid action, harnessed thunder, cataclysmic acceleration as demonstrated to the Editor by the G.P. Scarab, newly powered by a Chevrolet V8. Come along for the ride of your lifetime!

• I'd thought about it a lot, but never visualized it this way. Perhaps, fearing it would never happen, I'd preferred not to visualize it at all. After a month's advance planning, after a transcontinental jet flight, here I was at Riverside Raceway at 8:45 on a cool, cloudy morning, face-to-face with the Scarab-Chevrolet.

In person this alloy-sheathed machine was daunting. My first view of it was head-on, next to the RAI van. It crouched with a boxer's ready stance, belligerently slung among four big Dunlops. It had reason. Of the two 1960 Scarab Grand Prix cars, one was rebuilt for the United States G.P., then fitted with the three-liter Meyer-Drake for Interncontinental Formula races in England. The other car kept its original rear-mounted fuel tank and its long nose and tail, but for Free Formula racing in Australia and for the personal exhilaration of Lance Reventlow the Scarab four was extracted and replaced by a booming Scarabized Chevrolet engine.

Because the car is small, the engine size was kept small too—by RAI standards! Stroke is stock but bore is up to an even four inches for a displacement of 301 cubic inches or just under five liters. Realizing this car would have trouble getting enough rear-wheel bite at low speeds, the crew cammed it for high-rev power and not for torque; a modest estimate of its output is 320 bhp at 6500 rpm. This, gentlemen, is a clear hundred horses more than the G.P. version, almost half again the power!

Weight wasn't increased as much as you'd think. Complete with manifolding the Scarab four weighs 375 pounds—disappointingly heavy—while the Chevy is substantially lightened with its light-alloy front accessory drive, Hilborn injection and welded tube headers. Car weight is up less than a hundred pounds to 1375, and front/rear distribution remains an accelerative 40/60. A slight fault, with the V8 placed in line with the left-side drive train and canted to the right, is an overbalance of weight to the left. Only one new hood bulge was needed for the left-hand rocker cover.

In power-to-weight terms this car is a prodigy. Each horse has to propel only 4.3 pounds which, if you survey the field, is just about the hottest ratio in racing cars today—or yesterday, for that matter. Standard Corvette gears transmit power to the Halibrand rear end, whose ratio has been steadily raised during development in the course of making a movie with the car. Chuck Daigh kept stuffing in higher and higher cogs without even making the Scarab-Chevy breathe hard until the combination reached the present 3.00 to one. With this ratio and with cameras on the car Chuck had reached 6800 rpm in top at the middle of the Riverside straight, equal to 185 mph!

Here's the position of power. The deep bucket seat was just right, no belt being fitted or needed. Controls were perfect.

Wayne Thoms had gleefully related this performance statistic to me the night before; now we arrived together at Riverside to meet RAI Managing Director Warren Olson, mechanic Paul Camona and vacationing European Editor Jesse Alexander. Warren had already warmed up the Scarab, which waited expectantly at the end of its starting tow rope. Now he checked me out:

"You remember we took out the synchromesh rings for the four-cylinder engine; we've left them out and kept the gear locking mechanism. You have to push the clutch right down to shift but she'll never jump out of gear. There's no reverse. To the left of the lever there is the main fuel valve. Don't turn that 'til you're ready to go. Second is good for starting, and that left-hand toggle switches on the mag. You'll find it's a little tricky getting the tow rope clear but don't worry about it. We've just put in a fresh engine so there shouldn't be any problems. This thing's no toy, you know, so take it easy." The last was understatement indeed!

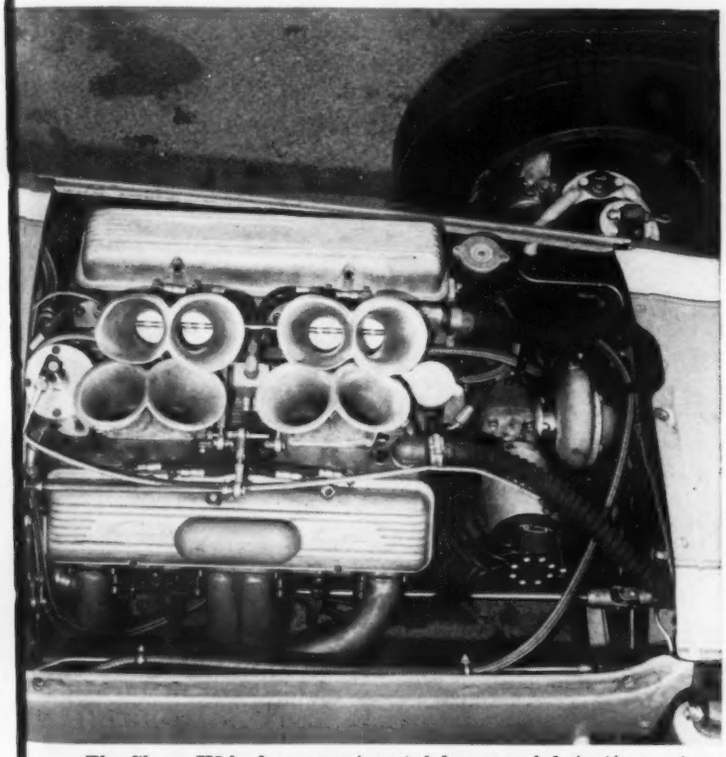
Getting into the Scarab was extremely easy, since the seat is offset toward the right side so there's not much bodywork to swing over. As I settled down into the long, black-cushioned seat I breathed a sigh of happy relief: it was a perfect fit! Chuck and Lance are long-legged enough so there was just enough room in the aluminum-walled channel that extends to the pedals. The seat angled back nicely and supported my thighs right up to the knee joints in sumptuous fashion. With the slight proviso that the high seat sides were a shade too wide apart, I'd say the car could have been built around me. The day was off to an excellent start.

Reaching out, I found the wheel at just the right distance and placed more vertically than I'd expected. It sat low in my lap but never caused wheel-hand-leg interference. Its wooden rim is normally thick with a very smooth finish, and has three flat-black spring spokes riveted to a slightly dished hub. The crackle-black dash carries a big Smiths tach and Stewart-Warner dials for oil and fuel pressure and oil and water temperature. Down below I located the metal-faced pedals, spaced to leave just the right amount of foot space but no more. The clutch felt stiff but remarkably short in travel while the accelerator had a very long range of movement. Everything felt just right; we were ready to go.

Jesse was in his station wagon, engine running, ready to tow. I switched on the fuel supply. With my right hand I unwrapped from the left-hand rear-view mirror the length of clothesline that releases the towing cable hook. At the same time I kicked out the clutch and engaged second gear with my left. Then I transferred the line from right to left and signaled Jesse to move out. He eased away and the Scarab trundled silently in his wake. At what I judged sufficient speed I engaged the clutch and reached across to flick the ignition toggle with my right. She burbled a bit—easy on the throttle—then banged into raucous life. I tugged the line with my left and freed the catch but I was too slow in clearing the clothesline with the result that some remained on the left front wishbone. But I didn't even notice because at that moment I was rolling onto Riverside track at the wheel of this potent Scarab, come alive.

For me all the 25-odd laps I drove were exploratory, but the first were especially so. I began by surveying the view around me. The forward outlook was sensational. As a side view shows, the Scarab cockpit is fairly high in relation to the remarkably low hood, and you sit right back next to the differential and practically against the right-hand half-shaft. As a result you look as much onto as over the slim front half of the machine, broken by its swelling scoop and bulge, decorated in light metallic blue with red-trimmed white striping, and terminated by a way-out pair of spinning Dunlops. It really makes you feel in charge.

Around me was the neat cockpit, reassuring in its riveted starkness, and out of the corners of my eyes I could always see the rear tires looming shoulder-height, looking far larger than 6.50 x 15. There was a tremendous sense of being personally propelled by those two big wheels, of aiming the resulting forces with that precise steering wheel. I could easily look over the low wrap-around screen which offered amazingly good wind protection. With my visor I'd been concerned about this but at no speed was there any wind buffeting in the cockpit. Occasionally I'd lean out to look around and be reminded that hurricane velocities prevailed!



The Chevy V8 had an experimental dry-sump lubrication system, using a Lincoln pump (next to firewall) for oil scavenging.

Next I explored the accelerator's long travel. Below 2500 rpm the injected Chevy would stutter and gulp; above that it responded soundly on all eight though excessive use of full throttle below about 4000 would dampen but not douse the fire with what felt like too much fuel. From 4000 on up the big chronometric tach needle would leap across the dial in a series of convulsive snatches until it hit 6000, which was the limit I tried to hold that day. It wasn't hard, because the thousand revs between five and six held more performance than I'd ever believed an automobile could offer.

The noise helped, of course. From each bank of cylinders four big pipes pour sound into a single huge pipe which finds its voice just ahead of each rear wheel, about a yard from the driver's head. This voice, at

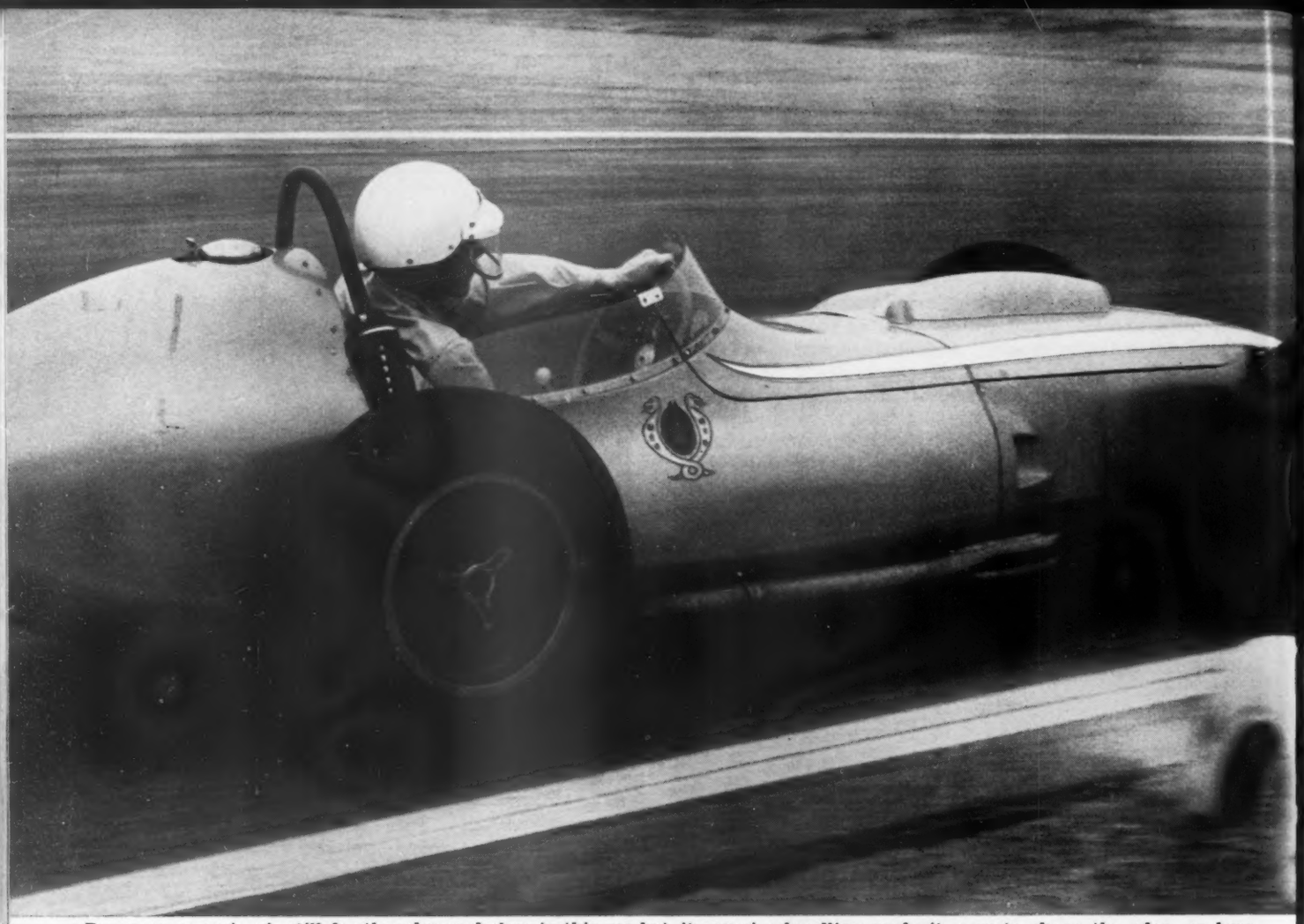
Mechanic Paul Camona cleans an imaginary speck from the roll bar and Warren Olson watches while the Editor takes the wheel.

speed, is a hammering metallic roar that strikes the eardrums with electric, shattering impact. Generally the V8 has a hard, smooth feel but at high revs there's an added shrill vibration that gives the racket a ringing tone. With power on it's absolutely impossible to hear any other sound except the beller of this Chevy. Since I didn't wear earplugs, it was practically impossible for me to hear anything *after* driving the Scarab! When I finally switched off in the pits I saw lips moving around me but heard only a roar, as of a waterfall, with some voices coming through like crackling static. Six hours later it began to clear up; next day I could hear normally again. Fantastic.

Turning on full throttle in second or third gear at about 5000 rpm was an orgastic experience. Acceleration of this projectile was so pulverizing that it wrung from me involuntary cries of exultation! I had to yell, shout, seemingly release in some way the internal pressures caused by this catapulting through space. If this is what drag racing's like—and it must be—I can see why it's so popular. It might truly be said that the acceleration forces press back the jaw and cheeks in a manner strongly resembling an ear-to-ear grin!

So it's fun, but is it usable? I was amazed at how well the Scarab puts this power on the road. I'd certainly expected a monster that would spin wheels at a toe's touch; instead I found a monster that could really get a bite! The matching of camshaft to chassis was very successful in the top two gears, with the power only coming in at speeds where it could be used for propulsion. Of course if you peak out in third at 6500 or so—equal to 135 mph—you'll be shifting to 5000 in top, and you can be sure sudden clutch engagement will vigorously tweak the tail. 6500 also corresponds to 81 in first and 107 in second. Horsing around in these gears would engrave the pavement with sweeping loops of rubber, but you don't horse around in such a car.

I didn't take the Scarab to 6800 in top, like Chuck Daigh, but lap after lap I did take it to 6000-plus, equal



PHOTOGRAPHY: ALEXANDER, THOMS

Power-on cornering is still for the advanced class in this car but its precise handling made it easy to shave the edge, as here.

to about 165 mph. Getting up there is just a matter of shifting through the gears at an easy pace. It reaches 6000 easily just after you top the rise in the Riverside straight and head down into the "cut", i.e. about one-third of the length of the straight. That rise, in fact, made me feel just light enough in my seat (no seat belt) so I didn't care to keep accelerating hard enough to reach more than 6000 in top easily.

Once up to speed you merely motor down the rest of the straight in this incredible car, holding the wheel with fingertips, sitting back and resting your arms on the seat sides, as in your living room, glancing over the instruments: oil temperature about 180°, pressure holding at 40 psi, water temperature 140°. Of course the road looks luridly blurred, you duck comically under the twenty-foot-high quarter-mile banner, and that timing house comes up awfully fast. But the Scarab storms straight as an arrow with strong built-in stability that I tested at lower speeds by giving the wheel a hefty yank to one side; it sprang back straight without deviating from its course or oscillating even slightly.

From the above you'd guess the car has a high moment of inertia around its vertical axis, and thus makes turns reluctantly—resists being deviated from its prevailing direction. This is true, with the main masses placed well to the fore and aft. It means that if you pitch it suddenly into a slow corner the front end will break loose and "plow" somewhat before the rear will do the same. The Scarab-Chevy understeers strongly in spite of its rearward weight bias. I'm sure a highly skilled driver could apply throttle and induce power oversteer to compensate for this, assuming he had enough road left, but my impression was that the Scarab didn't like to make this important transition in a smooth and controllable way. It seemed a narrow choice between even more plowing with more power, and excessive rear-end breakaway. In this respect the Birdcage Maserati, for example, is more agreeable.

One factor here may be the use of conventional sliding splines in the car's drive shafts. Unlike the ball-type splines used by Ferrari and others, these tend to freeze solid when power is applied—especially with this power—and foul the rear suspension movement. In corners the car seems to sit absolutely flat and firm, giving no feeling of lean. It has anti-roll bars at both ends, $\frac{5}{8}$-inch in front and $\frac{7}{16}$-inch in back.

With this understeer I soon realized how important it was to steer into a fast corner long before I'd actually entered it. Typical was Riverside's Turn 1, a blind-browed left-hander that had to be entered very early. Through the Esses up to Turn 6 I learned how easy it is to use up valuable road in a fast car if you don't take just the right line; Turn 6 itself was great fun, one of the few places I felt I could use the power in a corner. Left-hand Turn 7 is awkward, made more so by the Scarab's right-hand driving position. I once put two wheels off the road on the exit from 7. I found Turn 8 an exasperating switchback in this car, and sweeping Turn 9 was another place I could apply some power.

The Scarab's steering is admirably direct, with $1\frac{3}{4}$ turns lock to lock. In the straight-ahead position there's a shaved inch of lost motion, just an iota of free play like that in a fine machine tool. The feel is initially light, heading into a corner, then grows progressively heavier to signal the amount of work the tires are doing, then lightens again when the front wheels lose

PHOTOGRAPHY: ALEXANDER, THOMS

Ludvigsen scratches his skull in amazement at the prodigious performance as Warren Olson checks the engine room for liquid leaks.

adhesion. The whole car has a solidity typified by this steering feel. Its construction is so thorough that there's none of the rattling and flapping associated with racing machinery; it felt smooth, rigid and dead quiet—except the exhaust, of course! The ride was steady but not rock-hard; the Scarab rolled proudly and lithely over Riverside's few bumps and ripples as though it owned the track. It pretty much does.

Not wanting to take the slightest risk with this unique car, I didn't use the brakes hard at all. Well placed for heel-and-toe action, the pedal has the long travel and soft feel characteristic of non-servo disc brakes. Resulting effect was always smooth and even if not dramatically powerful, they never hinted at letting me down. I admit I never got the hang of proper downshifting before corners with the interlock action combined with unsynchronized cogs. Going up was no problem, but going down a clean shift was exception rather than rule. With a shorter lever, the shift pattern was even more compact than the Corvette's.

During the whole morning I never tried to put together a fast lap. I'd concentrate on the Esses one lap, Turn 9 the next, then open her up down the straight. In view of this I was astounded to find that this terrific race car had carried me around in as quickly as 2:10. Chuck Daigh's fastest, carrying cameras and not really going all-out, was 2:00; 1:55, or good 1960 G.P. time, seems easily within reach. On this basis our proposed Formula 366 seems entirely practical, and as far as I'm concerned single-seaters of this type are deceptively easy to drive fast. Of course when you start aiming for top lap times you'll have to pull out all the skill you possess, but at least a car like this has ample power to use for simultaneous acceleration and control.

I finally switched off in third gear coming out of Turn 9 and kicked into neutral to coast silently into the pits. I braked to a stop behind the van, scanned the dash a last time, looked up to see Warren Olson grinning down at me. "Like a little more power?" his voice crackled through. I grinned back, shook my head slowly in mingled wonder and respect. This was a morning to remember. —*KEL*

Wavy lines warn driver to shut off before entering tricky Turn 7. Scarab consumed that short straight in one convulsive leap.

FERRARIS FLY NOSE-DOWN

by JESSE ALEXANDER

Road-holding troubles cause Ferrari defeat in this eventful race at the Nürburgring by Lotus-mounted Stirling Moss, who trounced all opposition, leading from the end of the first tire-shredding lap to the finishing line.

● The 1961 Grand Prix of Europe held on the Nürburgring was a sensational triumph for Stirling Moss driving Rob Walker's Lotus-Climax. Moss went into the lead on the opening lap and never once was his dark blue Lotus really in danger of being overtaken by the Ferraris of Hill and Trips. Phil Hill, however, took fastest lap of the day, turning a sizzling 94 mph lap in a time of 8:57.8. Von Trips, finishing second, added six points to his World Championship total and leads with 33 points, in front of Phil Hill with 29.

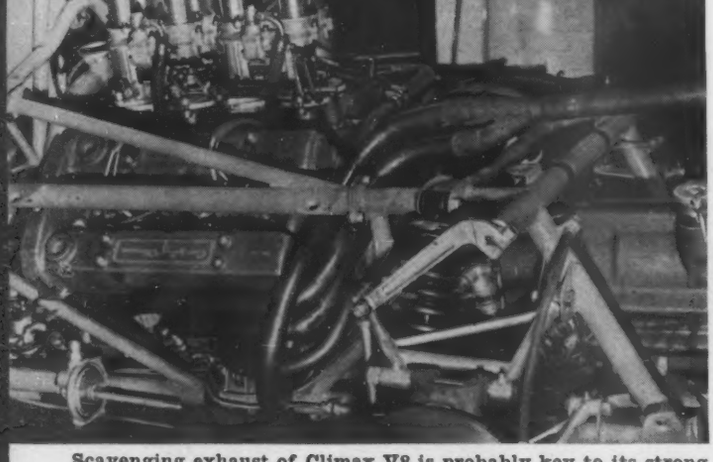
One never ceases to be awed by the Nürburgring. Its 14 miles of up-and-down-hill curves and flat-out straights call for extreme precision and repeated training, perhaps more so than any other circuit. By extensive practice it can be learned well and for the 1961 Grand Prix, the first to be held on the full circuit since 1958, laps of *under* nine minutes were forecast for the 1.5-liter single-seaters. This prediction proved accurate on the first day of practice when Phil Hill turned a lap in 8:55.2, said feat winning him the pole position on Sunday's grid. The best time his arch-rival von Trips could do in practice was a 9:05.5, due mostly to a bad-handling automobile.

A sensation of the weekend was the first appearance of the Coventry-Climax V8, looked after by a group of Climax engineers led by Wally Hassan himself, the engine's designer. Installed in a special Cooper chassis prepared for Jack Brabham, the V8 did not arrive until late and John Cooper and his mechanic, Mike Grohmann, set to work to prepare it for the race.

Fangio acted as starter with the same air of calm authority that won for him four years before at the Nürburgring.

Owner Rob Walker keeps track of his Lotus-Climax and Stirling Moss as they turn in a splendid winning performance.

Saturday saw a special early morning session for the Climax and for Ferrari as well. The Ferraris were in real trouble sorting out their handling problems, the cars being virtually unmanageable at speeds faster than 9:10. After valve spring trouble the previous day, Trips had a new engine at his disposal but due to a late start did not improve on his times. Ferrari was by that time trying different suspension settings—roll centers higher or lower—and the drivers, as usual, were of different opinions as to which was best. Brabham meanwhile nipped out and turned an 8:59, the first significant demonstration as to the new Climax's potential, a good ten seconds better than the four-cylinder. Worried frowns on John Cooper and Wally Hassan turned to sunny smiles and Hassan remarked, "as soon as we get those back two carbs opened up, then perhaps we can do some good." But the engine was boiling during mid-day's session and Brabham could do no better than a 9:01.4; nevertheless, it was the second best training time of the weekend and it put him next to Hill's Ferrari on the front row of the grid.



THE AUTOCAR, LONDON

Scavenging exhaust of Climax V8 is probably key to its strong output. Wet-liner engine's dimensions are 2.48 by 2.36 inches.

Third fastest training time was Stirling Moss's 9:01.7—just 3 tenths of a second slower than Brabham's lap in the new Climax. Joe Bonnier managed to squeeze onto the front row of the grid with his Porsche, with a 9:04.8. This was again last year's car; the flat-eight racing Porsche engine will now not be seen until next year because it's just not developing the expected horsepower. Gurney's car was fitted with Porsche disc brakes for the race. These proved to be irregular in use and *not* completely satisfactory.

Twenty-six cars assembled on the grid for the start

Jack Brabham drove the V8 Cooper-Climax with great verve and vitality during practice and was second fastest of all entries. A practice shot of casual Dan Gurney, who, incidentally, has not yet been seen wearing driving gloves in any race at all. Almost clipping the grass verge is Stirling Moss on his way to victory in the privately entered four-cylinder Lotus-Climax. Phil Hill made fastest lap of the day at an average of 94.88 mph in an all-out attempt to pull away from von Trips.

Grand Prix of Europe
Nürburgring, August 6, 1961
15 laps, 14.2 miles per lap

1	Moss	Lotus-Climax	2:18:12.4 (92.1 mph)
2	von Trips	Ferrari	2:18:33.8
3	Hill	Ferrari	2:18:34.9
4	Clark	Lotus-Climax	2:19:29.5
5	Surtees	Cooper-Climax	2:20:6.5
6	McLaren	Cooper-Climax	2:20:53.8
7	Gurney	Porsche	2:21:33.0
8	Ginther	Ferrari	2:23:35.5
9	Lewis	Cooper-Climax	2:23:36.1
10	Salvadori	Cooper-Climax	2:30:23.9
11	Maggs	Lotus-Climax	1 lap behind
12	Burgess	Lotus-Climax	1 lap behind
13	Herrmann	Porsche	1 lap behind
14	de Beaufort	Porsche	1 lap behind
15	Marsh	Lotus-Climax	2 laps behind

Fastest Lap

Phil Hill, Ferrari, 8:57.8, 94.88 mph—new record

of the Grand Prix (18 finished). The track was slowly drying from a shower that had fallen during the G.T. race an hour before and the sky was silent again after the breathtaking demonstration put on by the U.S. Air Force's "Sky Blazers." Juan Manuel Fangio was on hand to drop the flag after making a tour of honor with Karl Kling in a 300SL.

The self-starters ground away and the grid was cleared—Fangio dropped the flag and Brabham's Cooper eased ahead of the clutch-slipping Ferraris. Brabham led the pack down the pit straight and into the south curve, a sprawling, madly colorful mass of traffic which came booming up the back straight, Brabham still leading. Over the rise and down to Hatzenbach and then—in the words of Phil Hill who saw the whole thing, "Brabham obviously got onto a wet patch—there were still a few left in the woods and he lost control completely—first sideways one way, then the next; eventually he just disappeared through the hedge and was out." And thus the Climax V8 ignominiously was robbed of a good showing on its first outing. The Cooper was not seriously damaged but Jack was unable to get it back onto the road. The whole field roared by him—Moss now in the lead followed by Hill and Trips and then Clark in his Lotus (his second that weekend; Jimmy went off the road in practice and wiped out the front end of one of Chapman's cars).

But Brabham was not the only one out on the first lap. Charging into the south curve Graham Hill's B.R.M. touched Gurney's Porsche—got it sideways—then Graham lost control and shot straight ahead out into the middle of the corner, chasing photographer Yves Debraine as he went, with the B.R.M.'s steering gone.

At the end of the first lap, Moss was ten seconds ahead of Phil Hill—then Trips—followed by Herrmann and then Jim Clark. On the second lap Clark's teammate, Innes Ireland, lost his engine lid (it narrowly

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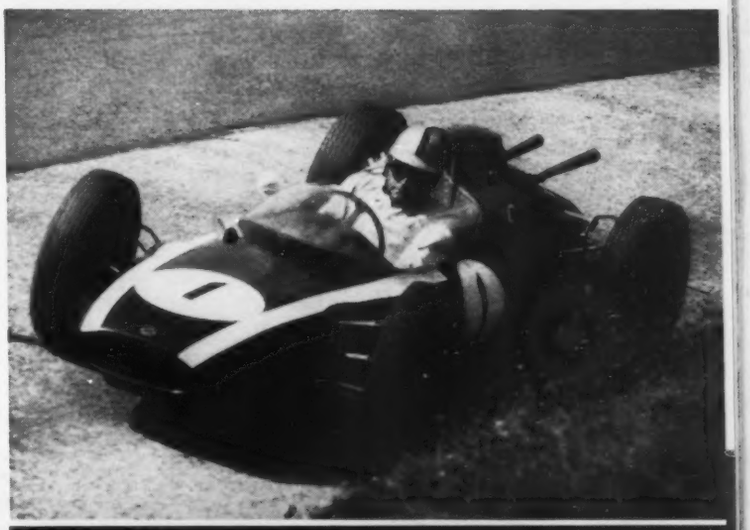
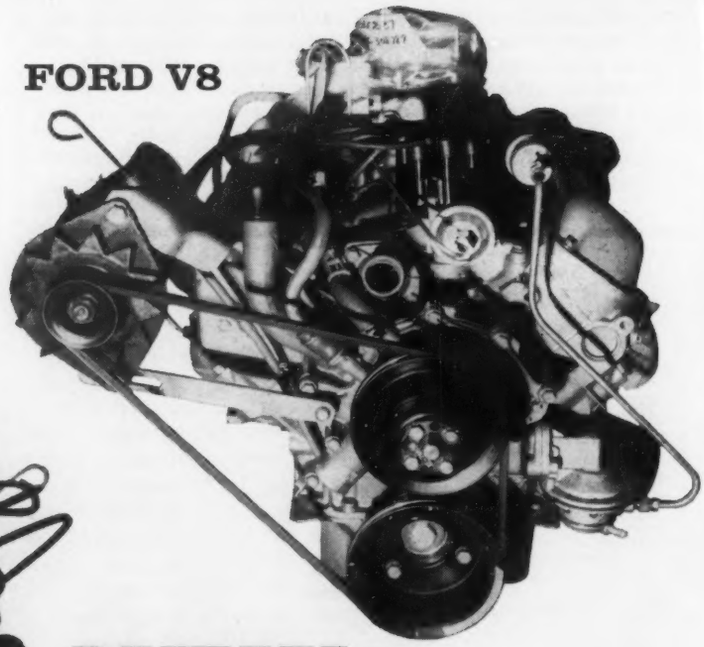


FORD V8

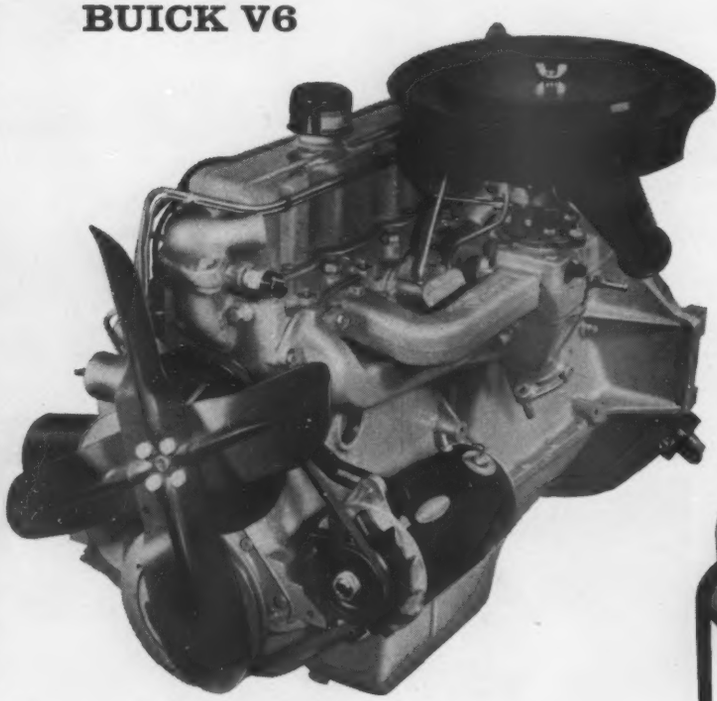


BUICK V6

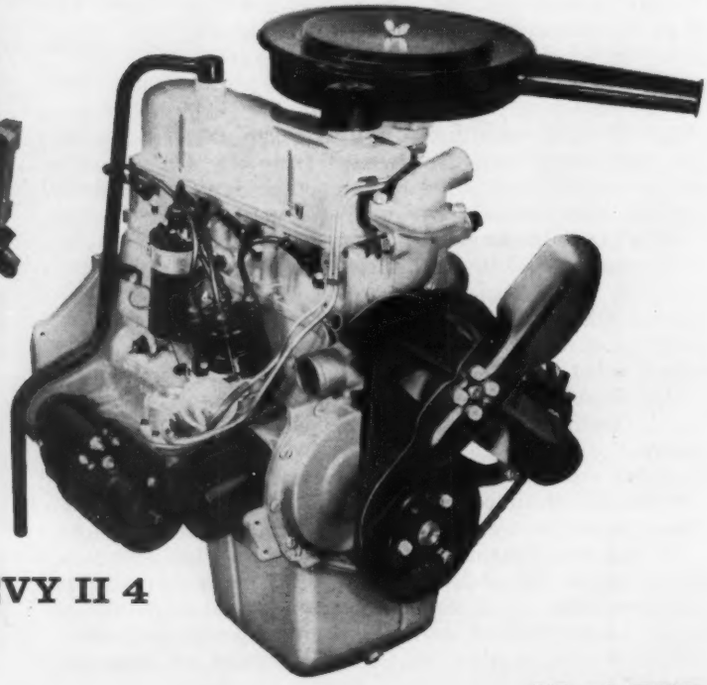
NEW ENGINES!

by KARL LUDVIGSEN

Lining up for the 1962 buyer's market are these interesting all-new power plants from Ford and GM. Originality of conception is matched by variety in design and individuality in choice of engineering materials and methods.



CHEVY II 6



CHEVY II 4

• Not long ago we thought of the Ford and Chevrolet sixes as among the smallest car engines in this country. That was changed in 1960, with the first wave of compacts, and changed again in 1961. Now for 1962 we have a new crop of little engines—a V8, V6 and in-line 4 and 6—that brings the total from the Chevrolet six on down to no less than 17 different basic powerplants! Among them are surprising differences and similarities that we hope will be evident from this story.

REASONS FOR BEING

Biggest of the new little engines is the 221-cube V8 by Ford's Power Plant Division for the new 115-inch-wheelbase Ford Fairlane and Mercury Meteor. Work was begun on this engine just over three years ago; at that time the target was merely motive power for a 3000-pound car. In its design and manufacture full use was made of the new foundry techniques—resin-bonded cores, in particular—that were first employed on a large scale in the Falcon engine. By better controlling the shape of the foundry cores, Ford has been able to cast the cross-sections the designer wanted, without adding iron to be on the safe side. It's been possible to save so much weight this way that Ford didn't seriously consider aluminum for this new V8. An interesting sidelight is that the displacement of this engine is exactly the same as the first Ford V8 of 1932!

Early production V8s were available for testing about 15 months ago, which Ford considers a very narrow margin. In amazing contrast, Buick engineers first ran an altered version of their small V8, to check out their V6 principle, a mere 11 months ago! Since then their trail-blazing bent-six has been engineered, tested and readied for production—a remarkable feat. It was facilitated by basing the new engine on the aluminum V8, removing the latter's front two cylinders and sharing the complete accessory drive, valve gear, bearings, etc. The result was naturally a 90° V6, the only such engine within our ken. Buick engineers admit it was an expedient, initially, but have since found the 90° layout to have many inherent advantages of simplicity and power which will be discussed later.

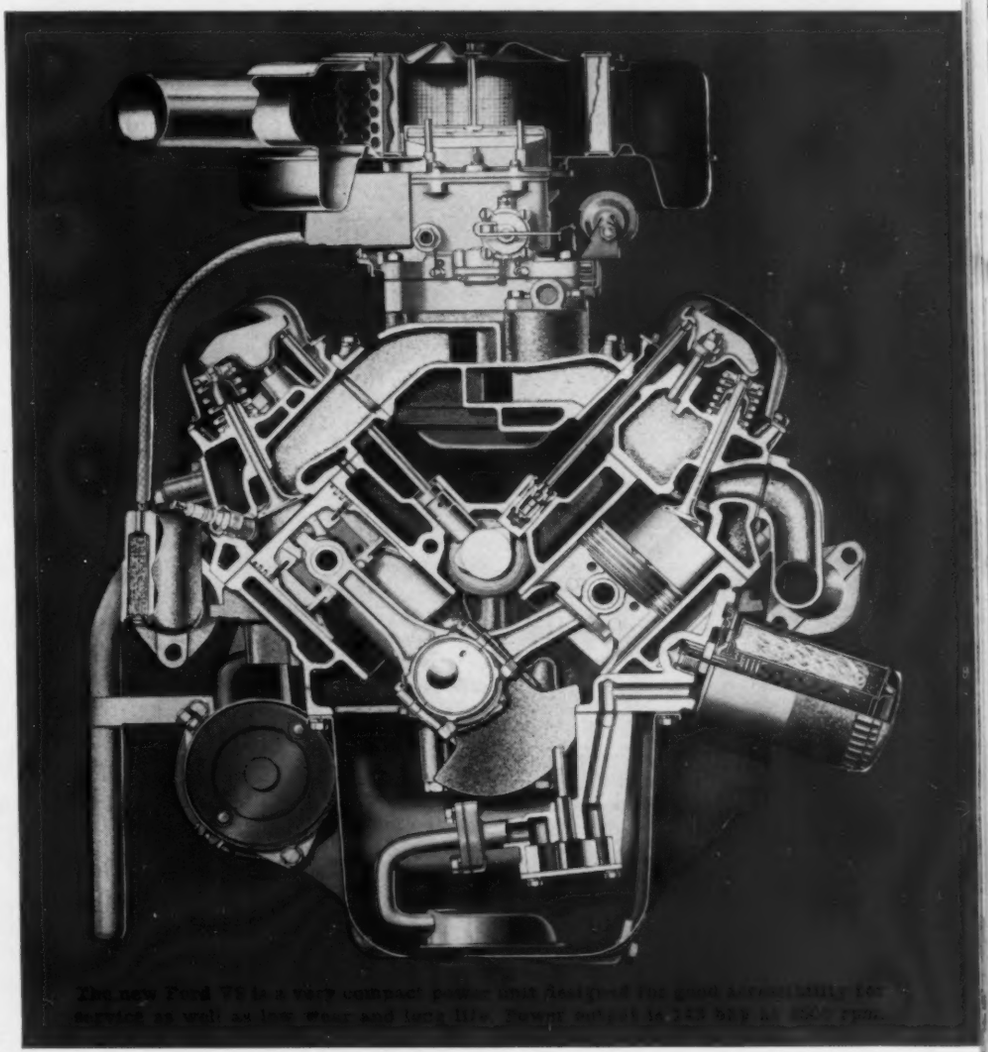
The new V6 is cast iron, while its parent V8 is aluminum. This does not, according to Buick, mean that aluminum is being phased out. The V8, in fact, is just now beginning to be produced at the cost that was originally budgeted for it. In its own area, it's beginning to pay off; it will definitely remain as the basic engine for the Buick Special and Oldsmobile F-85. What Buick wanted was a cheaper companion engine, like Pontiac's Tempest four, that would allow them to extend their working price range downward. The V6 serves this purpose.

In contrast to the Buick engine, which has about the same displacement, the first all-new iron six from Chevrolet in many years has all its cylinders in line. It's the premier power for a new line of cars called Chevy II, a complete series designed to provide head-on competition for Falcon. By removing two cylinders from the Chevy II six (specifically: half of number 4, all of number 5 and half of number 6) a companion four-cylinder engine was easily created. Both make use of as many parts as possible from the staple 283-cubic-inch V8: bearings, rods, piston pins, valves and valve gear (except rockers) are interchangeable, and V8 pistons fit the bore of the four-cylinder. The six has the smaller bore of the old Chevrolet six, which indicates room for future expansion. These new engines have been in the works for just over two years; in other words the Chevy II program was begun about three months before the Corvair was introduced.

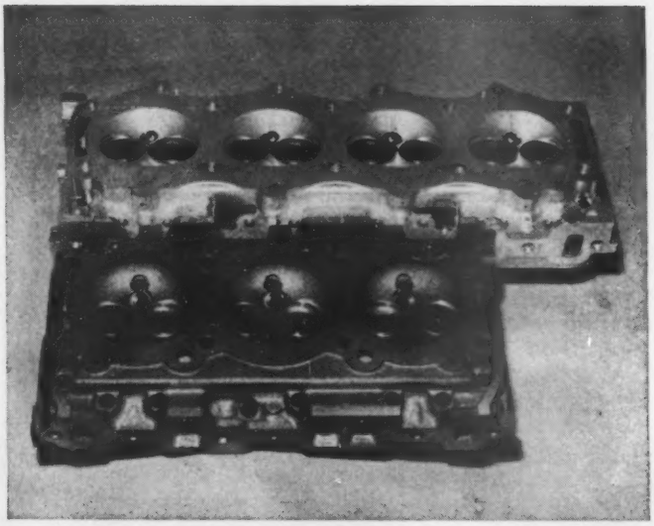
UNUSUAL BOTTOM ENDS

All these engines have rocker-box top ends with inclined in-line overhead valves, so let's survey their rather more interesting lower ends first. Since 1933 Ford has been casting rather than forging many of its crankshafts, a practice which is carried over to the new V8. To get maximum effect from a minimum amount of crank counterbalancing, added counterweighting is supplied outside the crankcase by a weight cast into the flywheel, at the rear, and by a bob-weight pressed onto the crank nose—in place of a vibration "Y-block" deep crankcase in favor of a wide, open bot-damper. To save weight Ford also dropped the recent tom end that stops at the crank centerline. Use of stresscoating techniques to find weak spots in the crankcase webs has ensured that rigidity is adequate.

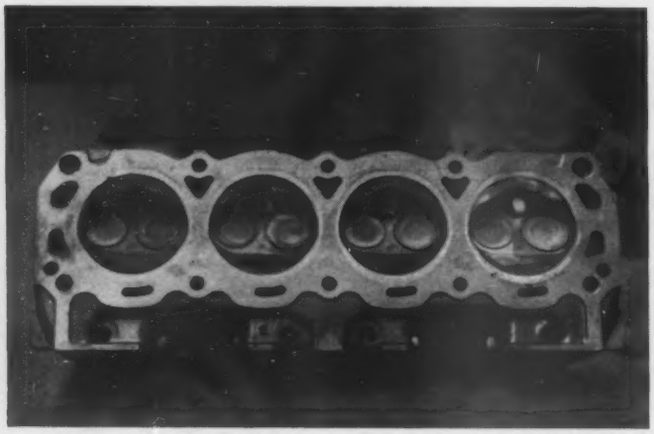
Buick refers to its V6 as "a 120-degree six with the



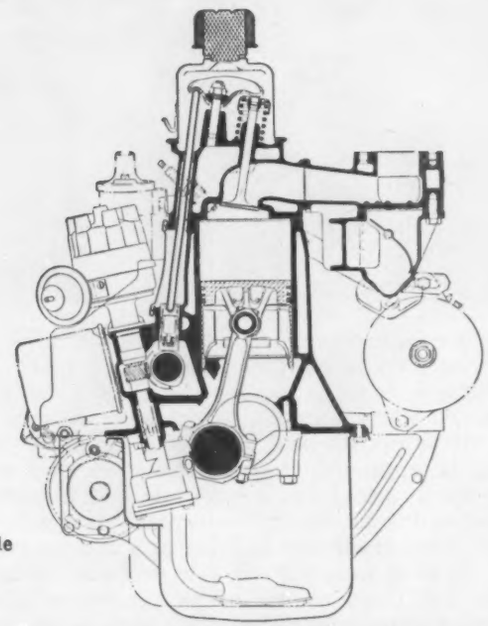
The new Ford V8 is a very compact power unit designed for good accessibility for service as well as low wear and long life. Power output is 145 bhp at 4200 rpm.



The V6 Buick has a larger bore than the V8 but this picture illustrates their close relationship in cylinder head design.



Cylinder head of 221-cube Ford V8 has wedge-type combustion chambers with large valves centrally located and 18-mm plugs.



1/8 scale

Sectional view of Chevy II engine reveals influence from 1957 V8, with better cylinder head cooling and reduced valve angle.

banks bent up to 90 degrees." It's true, in that the crank is a simple object with three throws spaced at 120° to each other, like a Saab crank. Each bank of three cylinders is likened to a three-cylinder engine with evenly-spaced 240° firing impulses, which is a boon to manifolding as we'll see later. This, combined with the 90° vee angle, means the crankshaft impulses, with the present firing order (1-6-5-4-3-2), are spaced 90°—150°—90°—150°—90° *ad infinitum*. On paper another firing order looked good; it gave this spacing: 90°—120°—120°—150°—120°—120°. Appropriate manifolding was made and the engine was run with acceptable output but with an unpleasant feel that Buick rejected.

Use of a cast crank on the Buick V6 allows wild counterweight shapes that do the best possible job of balancing the primary out-of-balance forces. Buick has investigated the much-discussed secondary unbalance of the V6 engine, relating their 90° unit to theoretical 60° and 120° engines with the same reciprocating weights, all at 4000 rpm. The 120° layout has a rocking couple that rotates in direction, around the crank axis, and varies from 107 to 322 pound-feet. The 60° couple also rotates but is constant at 219 pound-feet, while the 90° couple acts only in a horizontal plane at a maximum of 304 pound-feet. Buick engineers point out that their horizontal-plane couple is easier to combat with motor mount design than a couple that's constantly changing direction, which compensates in part for the larger couple they must work with.

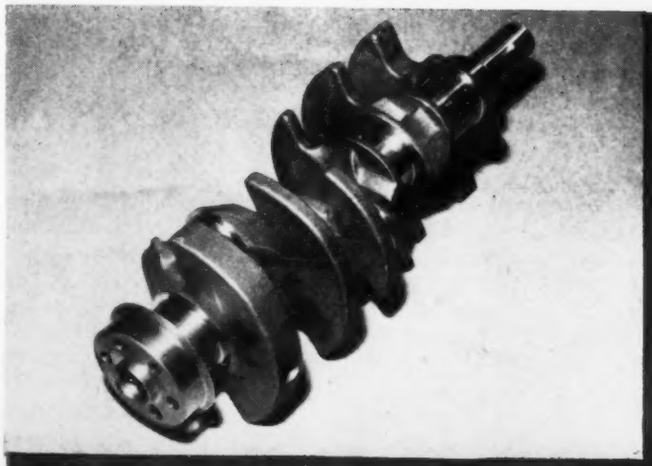
Since 1957 Buick has been experimentally running cast iron connecting rods with complete success. They're used in production on this V6 for the first time. Cast nodular iron is less dense than steel but the rod cross-section is increased, so the rod weight is about the same as a forged part. Center-to-center rod length is increased to 5.860 inches from the V8's 5.660 inches to match the six's expanded bore and stroke. Bore was increased by 1/8 inch, or not quite the depth of the iron liners in the aluminum V8. The V6 flywheel weighs 14 pounds more than that in the eight.

To look upon, the bottom ends of the Chevy II four and six are extremely rugged. To begin with there's a main bearing between each cylinder—five on the four and seven on the six. With all the main and rod shells the same size and type as used on the 283 V8, the margin of strength should be impressive here. Further, the cranks of both engines are forged steel, opposing the trend to iron castings evident above. The six carries a vibration damper (unlike the Buick V6) but the four does not. On both engines the block terminates at the crank centerline to save weight; strength is certainly no problem.

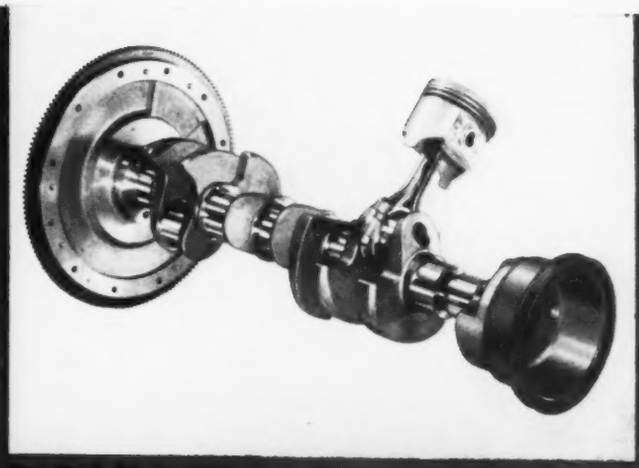
VALVE GEAR TECHNIQUES

As mentioned, these new engines have conventional valve gear but with some interesting refinements. On its V8, for example, Ford has used the Chevrolet-pioneered shaftless rocker arm, each mounted on its own ball-joint stud. Instead of stamping the cupped rockers as Chevy does, though, Ford has precision-cast them of highly ductile, heat-treatable alloy iron. Working surfaces are smoothed by a coining operation, so the only machining needed is the drilling of a tiny oil hole. The iron has proved excellent at retaining lubricating oil, and as a side benefit it helps damp out valve gear noise. High mounting of the camshaft within the central vee has kept the pushrods as short and light as possible.

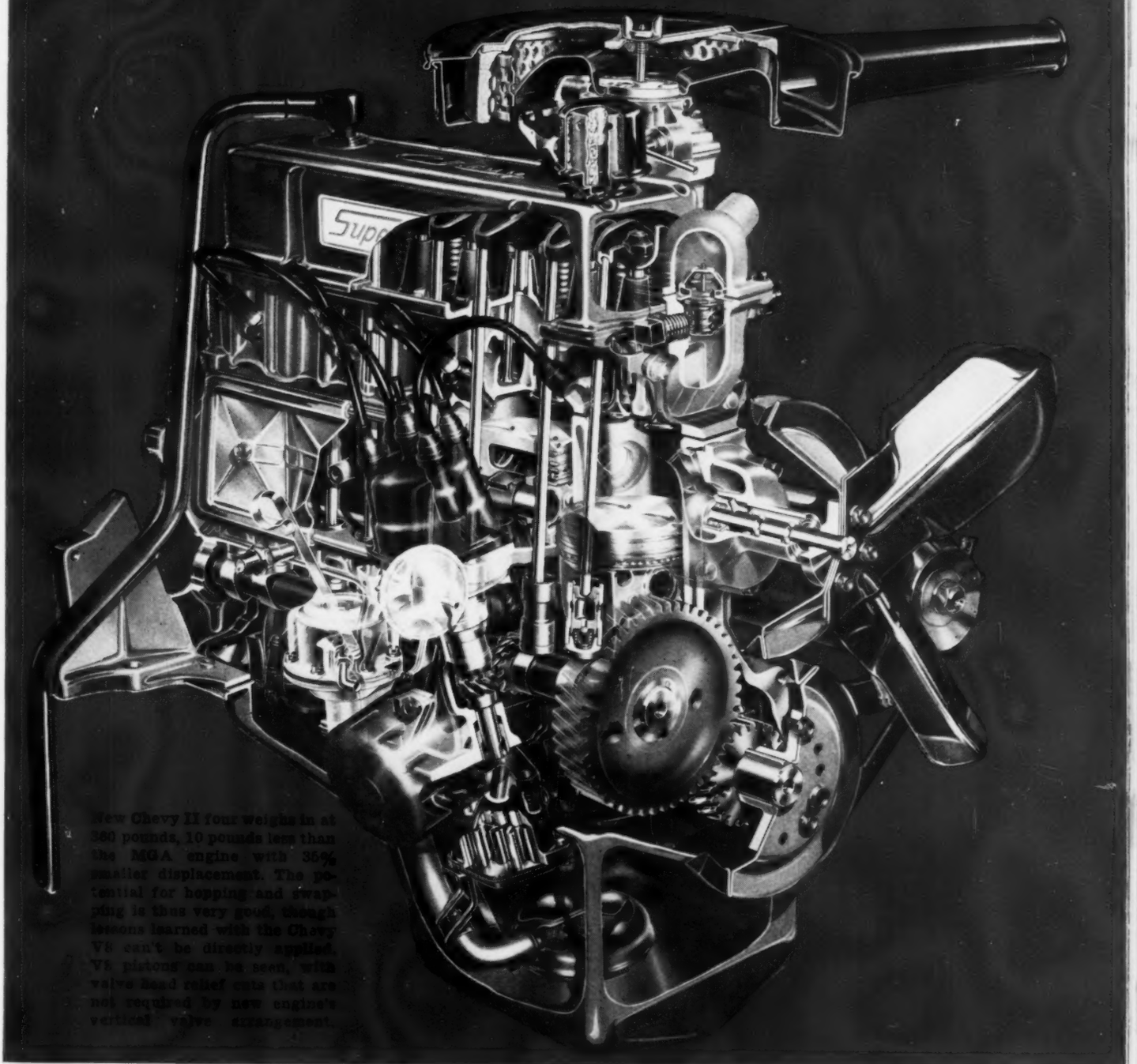
Within a very compact contoured-wedge-type chamber, Ford placed the valves in line with the maximum bore diameter to obtain relatively large valve sizes. Valve positions alternate—intake—exhaust—intake—



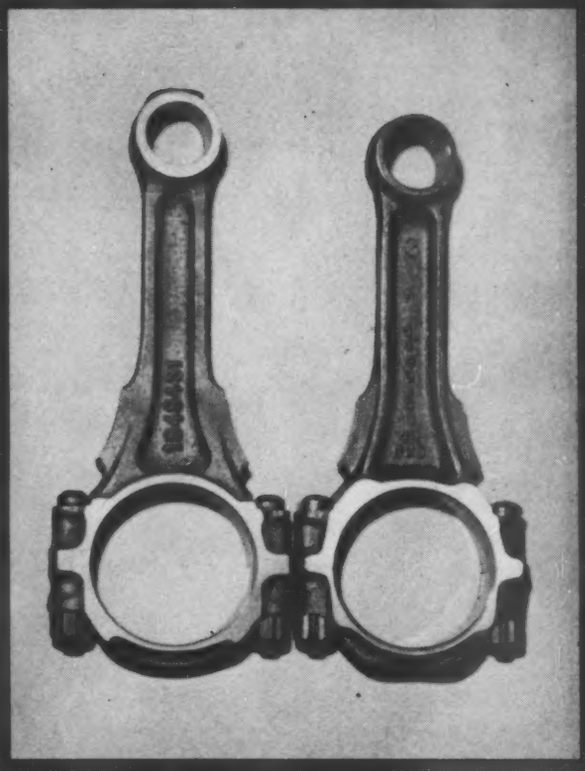
The elaborate counterweighting of the Buick V-6 crankshaft is rendered necessary by 90-degree layout and odd firing order.



New Ford V-8 pressure-cast alloy crankshaft is counter-balanced at both ends, obviating need for a vibration damper.



New Chevy II four weighs in at 380 pounds, 10 pounds less than the MGA engine with 36% smaller displacement. The potential for hopping and swapping is thus very good, though lessons learned with the Chevy V8 can't be directly applied. V8 pistons can be seen, with valve head relief cuts that are not required by new engine's vertical valve arrangement.



The Buick V6 engine is the first production power plant to use cast iron connecting rods. The forged steel connecting rod on the right belongs to the aluminum-block V8 Buick.

The lightweight cast iron Ford rocker arms illustrate one of the ways engineers contribute to reduce reciprocating weight, inertia forces and the internal engine friction.

exhaust—etc.—to minimize hot spots, and there's an individual port for each valve. Intake ports are laid out to produce gas velocities of 250 feet per second at 4000 rpm.

Buick wasn't able to approach its V6 valve layout from scratch, since for economy it was desirable to use the V8 valves and gear, including the very neat die-cast aluminum rockers and rocker stands. Since per-cylinder displacement was increased this meant the valves were on the small side, in their as-cast spherical chambers, so the cam timing was slightly liberalized in compensation. Intake and exhaust duration are 295° for the V6, against the V8's 280°, and overlap is increased from 62° to 77°. Gas flow within the chamber is also eased by the reduction in shrouding that results from the larger bore and more open chamber.

Though they use some V8 parts, as we said, the new Chevy II engines have a very different top end. Valves are now inclined at only 9° to the vertical against 20° for the V8, and the combustion chamber is nearer a modified bathtub shape than the V8's wedge. Use of a new design has allowed Chevrolet to put the pushrods on the side opposite the ports, greatly freeing the design of the latter; Pontiac's Tempest, like all rocker-box V8s, shares space between intake ports and pushrods. Head strength has also been improved by using about 50% more chromium in the cast iron than was usual with the old six. The rocker ratio is up to 1.75/1 from the V8's 1.5/1, and though overlap remains the same at 38° the in-line engines have more modest intake timing—perhaps to improve smoothness. Hydraulic lifters are used, unlike the competition at Ford and Chrysler.

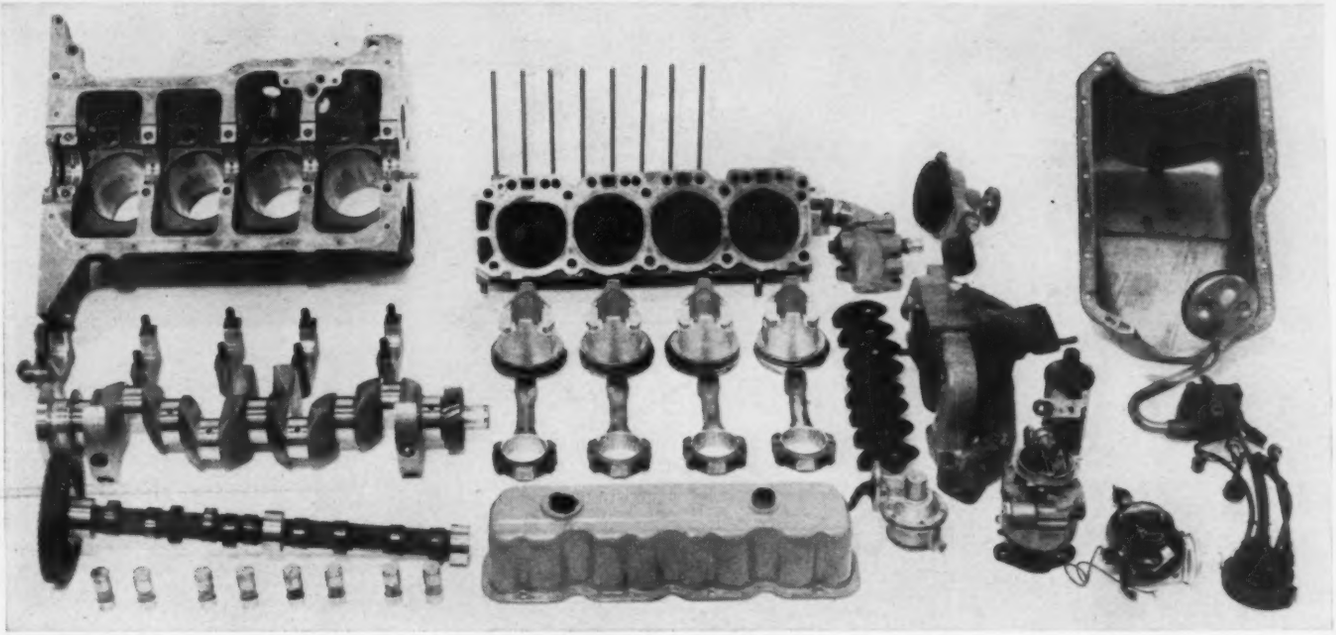
PIPING AND PERFORMANCE

None of the new engines is startling in the induction department. Ford's V8 uses a two-barrel carb on a new manifold using an artful combination of water and exhaust heating. Both Chevy II engines use the same single-barrel Rochester carb with different jetting, on conventional manifolding. Only the Buick V6 attracts interest, with its very neat manifolding made possible by the even firing of each bank. Each throat of the two-barrel Rochester carb feeds one cylinder bank, with no crossover passages required, and the pipes are long enough to give sufficient ram to have a very healthy effect on torque at around 2400 rpm.

On an 8.7 to one compression ratio, the Ford-Mercury V8 is rated at 143 bhp at 4500 rpm, and 217 pound-feet of torque at 2200. This compares interestingly with the respective 155 at 4600 and 220 at 2400 of the slightly smaller Buick aluminum V8. We've driven the engine, in the Mercury Meteor, and found it to be a smooth, modestly powerful unit not markedly different in feel from other modern V8s. Like all four of these new engines, it's designed to burn regular gasoline.

Buick's V6 has performed so well that their engineers say, "It's put us back to work on the V8 again!" Like the V8 it uses an 8.8 to one compression ratio, which may be lowered a hair because the iron head does slightly raise the engine's octane requirement as compared to the aluminum-head V8. The V6 delivers 135 bhp at 4600 rpm and 205 pound-feet at 2400 rpm. The lower-tuned Chevy II six develops a modest 120 bhp (the four-banger delivers 90 horses), from almost exactly the same displacement. For quick comparison we have driven both cars, and we can say, highly subjectively, that the V6 seems to have more punch than the straight six, while the latter seems to score in overall smoothness, especially at idle and move-out speeds.

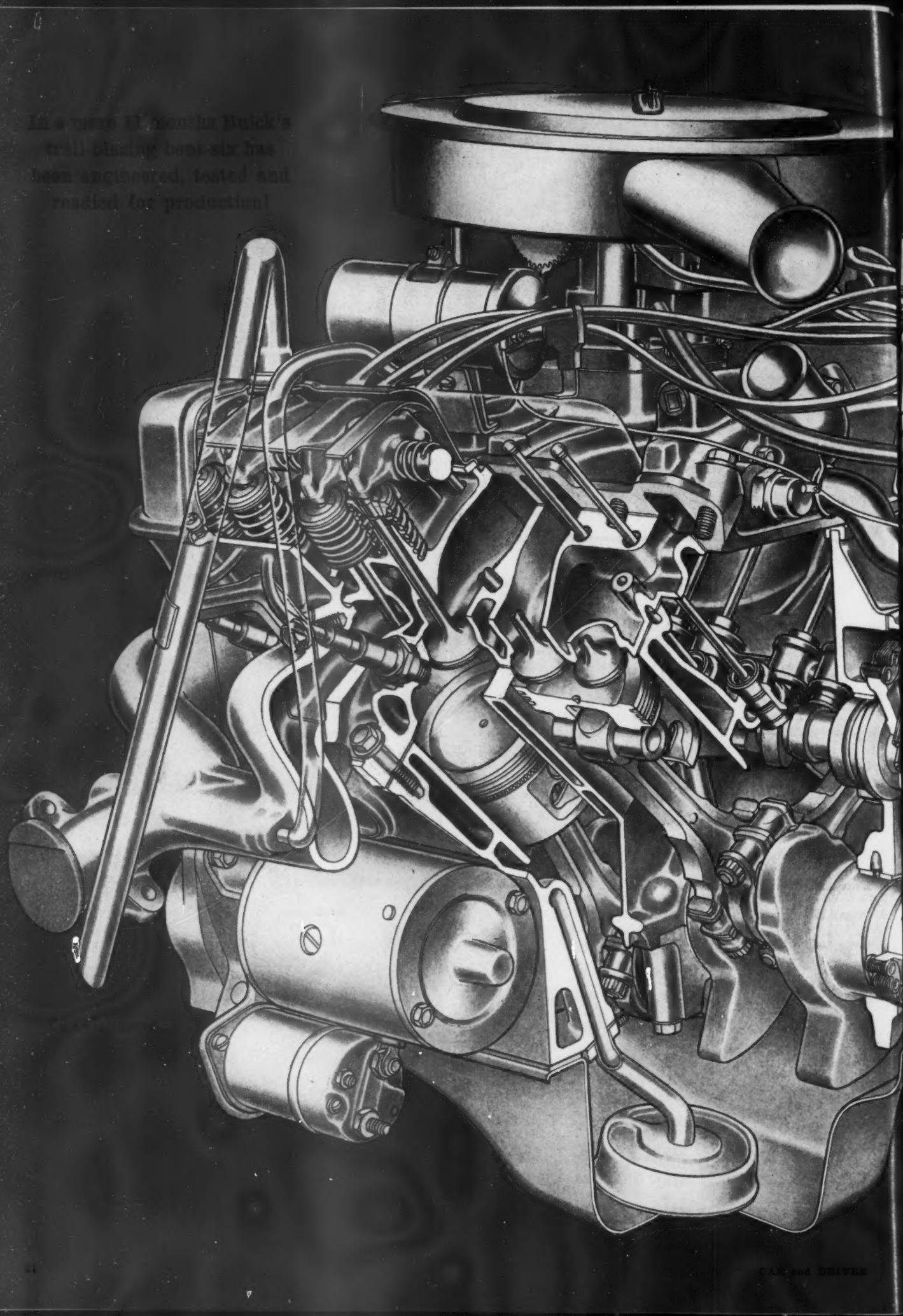
Both the Chevy II engines have an 8.5-to-one compression ratio, the same as the 283-inch V8. Both have

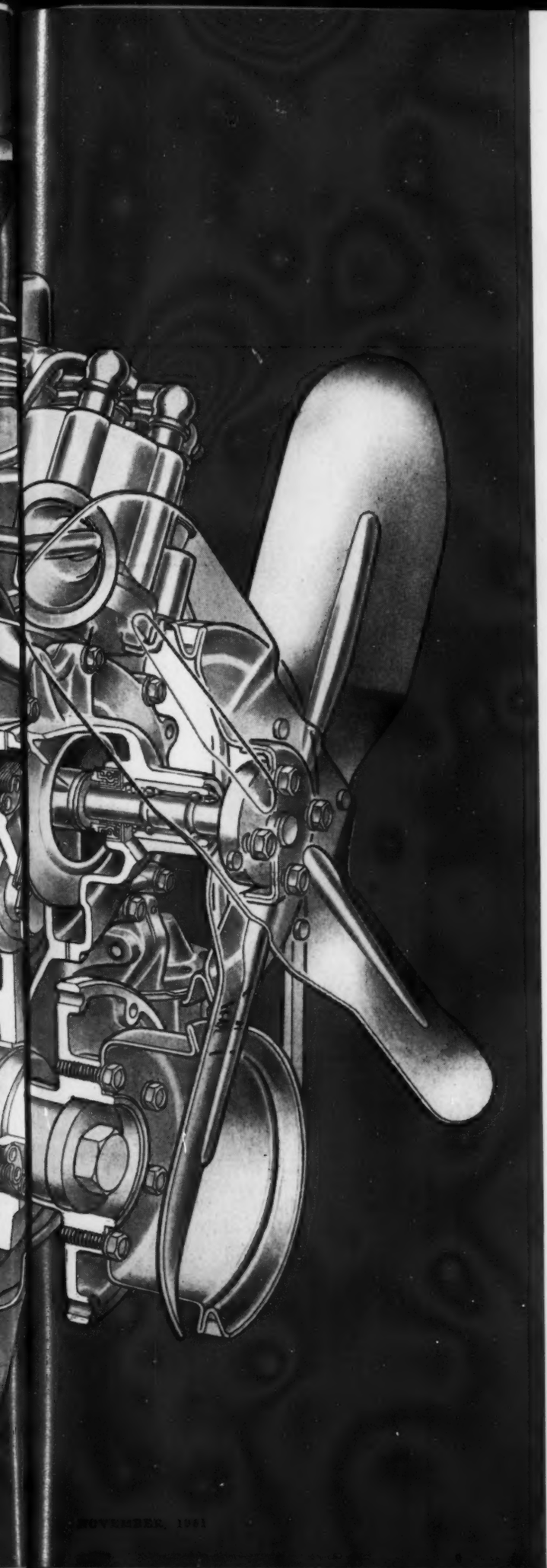


Many components of the four-cylinder Chevy II engine, such as connecting rods, bearings and caps, valves and valve gear parts, etc., are interchangeable with the six-cylinder unit. The cylinder head has high chrome content to assure strength.

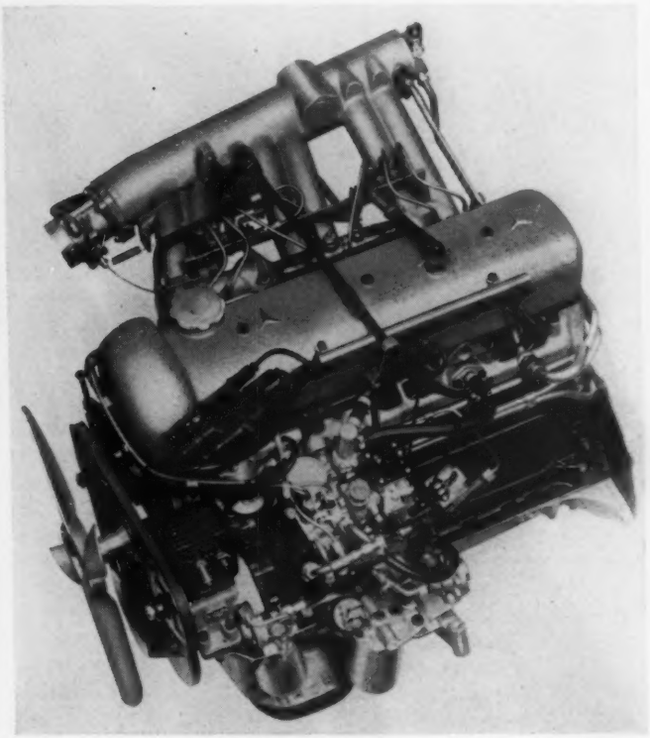
COMPACT ENGINE BASIC SPECIFICATIONS

CAR	DISPLACEMENT	TYPE	BORE	STROKE	BLOCK	WEIGHT	POUNDS PER CUBIC INCH	RANKING
Falcon—Comet	144.3	6	3.50	2.50	Iron	357	2.47	12
Corvair	145.0	F6	3.4375	2.60	Aluminum	292	2.02	3
Chevy II	153.0	4	3.875	3.25	Iron	360	2.35	10
Lark	169.6	6	3.00	4.00	Iron	520	3.06	17
Falcon—Comet	170.0	6	3.50	2.94	Iron	363	2.13	6
Valiant—Lancer	170.0	6	3.40	3.125	Iron	515	3.03	16
Mercedes-Benz 300	182.5	6	3.35	3.47	Iron	585	3.21	18
Mercedes-Benz 300SE	182.5	6	3.35	3.47	Aluminum	520	2.85	15
Chevy II	194.0	6	3.563	3.25	Iron	450	2.32	8
Tempest	194.5	4	4.06	3.75	Iron	505	2.59	14
Rambler	195.6	6	3.125	4.25	Iron	460	2.35	10
Rambler	195.6	6	3.125	4.25	Aluminum	379	1.94	2
Buick Special	198.0	V6	3.625	3.20	Iron	430	2.17	7
Special—F-85	215.0	V8	3.50	2.80	Aluminum	369	1.72	1
Fairlane—Meteor	221.0	V8	3.50	2.87	Iron	450	2.03	4
Ford	223.0	6	3.62	3.60	Iron	522	2.34	9
Valiant—Lancer	225.0	6	3.40	4.125	Iron	553	2.46	11
Valiant—Lancer	225.0	6	3.40	4.125	Aluminum	478	2.12	5
Chevrolet	235.5	6	3.56	3.94	Iron	608	2.58	13





a very solid feel, with their rugged bottom ends, and the four was specially impressive in its smooth operation. It's a brisk performer, even with the automatic box we tried, and the only time the four-banger makes its presence known is during starting and idling. We'd draw attention to the weight of the four, in the accompanying table, and the fact that it's ten pounds less than the MGA Mark II engine in spite of its 55% greater displacement! Many other interesting comparisons can be drawn from this unique table of weights and measures of the diverse array of compact-sized engines with two, for comparison, from Germany.



Aluminum-block 300SE Mercedes engine uses simpler two-plunger Bosch injection pioneered on 220SE, still looks very complex.

In fascinating contrast to the American swing back to iron, Mercedes-Benz has just announced an aluminum-block version of its 300 six for the new 300SE model. They started light-alloy research five years ago and began working with the 300 block three years back. They tried chrome-plating the aluminum bores, Porsche-fashion, but found it very difficult to get six perfectly-plated bores in enough blocks to make it worthwhile. Porsche can work with single cylinders; even the chromed-bore 300SLR engine was made up of two four-cylinder blocks. Anyway Mercedes wasn't satisfied with the durability of either chromed bores or high-silicon alloys without bore protection.

Thus the production block is permanent-mold cast (with sand cores) of a heat-treatable Silumin-Gamma alloy, and fitted with thin (no rebores possible) pressed-in cast iron liners. The latter presented special problems since the 300 head-block joint is at 20° to the horizontal. Cast-in liners were tried, but they'd tend to separate from the block during heat-treatment, expansion rates being different.

Never happy with machining problems presented by iron main bearing caps, Mercedes—like Rolls—uses forged aluminum caps and compensates for the bigger running clearances by fitting a larger oil pump. By bucking the trend Mercedes has added great interest to this year of new engines. —*KEL*

ILLUSTRATION: CHRISTOS GIANAKOS

D.B.

by HUGH McGRILLEN

David Brown stayed away from race car circuits 20 years while building his powerful industrial empire. His return, complete with his own auto company, has provided much of the competition and color of contemporary motor racing events.

● One morning at the beginning of 1947 one of Britain's younger industrialists read a small advertisement in the morning's TIMES. It offered an unidentified car-manufacturing business for sale. In the Britain of that post-war era the auto industry was a tattered orphan by contrast with today's booming giant. Few investors were tying up their savings in what seemed, at the time, like a marginal enterprise. There was little reason for believing that the British car might be the bridging agent of the dollar gap. However, this industrialist made a special note of the ad; it carried a special interest for him. Head of a famous and fast-growing group of engineering companies, he had nursed a long-standing private ambition: to make cars answering to a high ideal in safety, performance and comfortable elegance. He sent a query for the details, got them, and bought the business.

The end-product of that quiet deal has become a symbol of our times. It is the gleaming G.T. model in the back of the exclusive fashion photo; it's the car the novelist puts his best-paying hero into; it's the dream with which every enthusiast furnishes his garage. More familiarly it is the Aston Martin. The man, of course, is David Brown.

The association of these two names is a lot more logical than a chance reply to a newspaper ad would suggest. Brown's engineering background and the technical bias of his numerous companies, along with his earlier enthusiasm for building and racing his own cars, provided a unique combination for revitalizing a tired concern with a proud tradition of high-performance cars. He was heir to an unusual combination of engineering tradition and successful engineering business. Born in 1904, he began his career as an apprentice at 17 in David Brown and Sons Ltd. The family business was founded by his grandfather in 1860, and young Brown was beginning the job in the accepted way.

At 17 he designed and built his own car. It was powered by a Sage engine, popular with constructors of the time, in a chassis of his own design. By the middle Twenties young David Brown was a regular competitor at hillclimb and sprint meetings in England, and had graduated from the Sage-engined model to a potent Villiers Vauxhall. Around about 1927 Brown Senior called a halt to the proceedings, and David was advised to reflect on the pleasures of staying alive and the responsibilities of increasing his interest in gear manufacturing and allied projects. For twenty years after he didn't even go to see a meeting. "I just couldn't bear it," he said.

In those two decades the David Brown companies grew from being the most famous British gear-manufacturing concern to a vast international corporation, embracing machine tools, steel and bronze castings, tractors and farm machinery and, of course, cars. Much of this giant growth had been due to the restless energy and initiative of the young man who gave up his car-building and threw his energies with the same controlled ferocity into company-building. These interim years were spent in management and learning the many sides of the various Brown companies. Foreign touring, of which he did a lot, particularly in the U.S., always seemed to inspire some new industrial venture. David Brown Tractors was started in 1937 after a visit to the U.S. had proved clearly to the far-seeing young Brown that farm machinery was a good thing for the man who bought it—and the man who made it.

His ambitions for this project got a poor reception from his own associates. The directors of the Brown companies threw out his proposals. In characteristic fashion he started the climb alone. He founded David Brown Tractors Ltd. on space rented from his father in one of the Brown factories at Huddersfield in Yorkshire. This "do-it-yourself" act is now producing about 16,000 tractors a year, with the biggest range in the world, and an annual turnover equaling that of the parent company. Up to 1934 when (*Continued on page 76*)

With Brown at the wheel an Aston Martin race car is pushed off for a first trial. Car is '54 Le Mans entry with Lagonda V12.

ILLUSTRATION: CHRISTOS GIANAKOS

AINTREE AQUACADE

by **JESSE ALEXANDER**

The new Ferraris proved to be mudders as they claimed 1, 2 and 3 in a soggy British G.P. Trips, below, led the prancing horse parade.

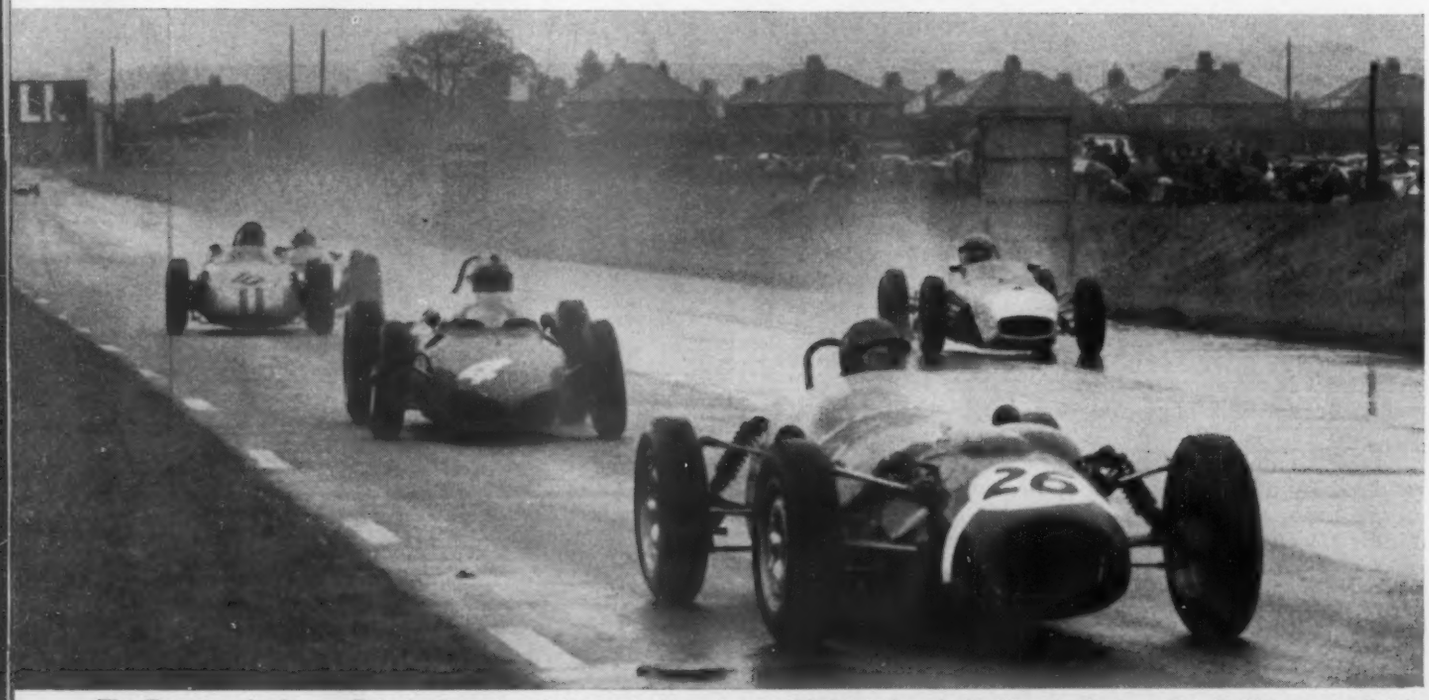
● Seems like it's always wet in England, almost as if the island constantly sits beneath a dripping sponge. For the 1961 British Grand Prix, this time held at Aintree near Liverpool, there was a middling strong wind off the sea to assist matters. Only one day of practice with a completely dry track —the first day—gave newcomers to the circuit precious little time to learn the course, the end result being that Ferrari practice times could have been an easy second or two quicker had the sun shone longer. Even with insufficient practice the race was another Ferrari benefit from beginning to end, without overlooking the fact that while it rained Stirling Moss had his Lotus-Climax in among the Ferrari team and within constant shooting range of von Trips who led for 62 out of the 75 three-mile laps.

The Aintree circuit is not the most popular in England; that's an understatement. Everyone grumbles about the track and its surroundings, five miles outside Liverpool, a huge greyish-black grimy city that I suppose is very typical of the solid stuff that makes up merry old England. The "Liverpudlians" speak an almost unintelligible dialect and the contrast between them and the population living south is pretty sharp.

Aintree is no doubt more famous as the place where the Grand National steeplechase is held every year; the motor racing circuit follows the horse track only partially. It is exactly three miles in length, does not drain well and is not an easy one for newcomers to learn. None of the Ferrari drivers had ever seen it before, much less driven on it. Phil Hill came almost a week ahead of time, found he could not drive around in his own car, then elected to walk and probably spent more time climbing over fences and water jumps than on the actual road course. Richie Ginther likened it to a quarter-mile midget track where a tenth of a second really matters (the official timing was done in *even* tenths of seconds and never once was a time given out that ended in an odd digit). Aintree, to sum up, is a typical English circuit, very airfield-like in character yet with tricky off-camber portions, as well as two or three places where a mistake could be disastrous to car and driver. Both at Anchor Crossing and Melling Crossing the road passes through great wooden gates constructed of solid 18 x 18 beams backed up by spiked fences that are padded optimistic-like with haybales but nevertheless present obstacles to be *avoided*.

If Hill, Trips and Ginther were lost at Aintree, how about young Giancarlo Baghetti, who now as number four man on the Ferrari team (despite the fact that the car is formally entered under the name of Scuderia Sant Ambroeus) has a reputation to uphold. Baghetti found himself in a completely strange land on unknown ground, and regrettably his performance showed his uncertainty. He was driving Trips's Monaco car with the 65-degree V6 engine while the other three cars were powered by the now-famous 120-degree engine that has put Ferrari into an unshakeable lead in the first year of 1.5-liter F.1 racing.

Ferrari engineers are still experimenting with the chassis, and revised front roll centers were tried on the Aintree cars; the end result was a good-handling



The Ferguson leads von Trips's Ferrari and Gurney's Porsche. Just behind Dan is Brabham's Cooper, first British car to finish.

Baghetti's troubles grew worse and worse. Tavoni gave him instructions, but the track was strange, it rained and he crashed.

car but one which was not tuned as well for the Aintree circuit as they would have liked. As I said earlier, had the weather allowed more practice on a dry track, the times of the Italian cars would most certainly have been faster. Baghetti spun twice in practice and in the race itself went off the road on the straight just before the first corner as the car in front of him braked early, forcing him to swerve sharply; he got onto one of the numerous puddles at the side of the road, lost control and crashed, damaging the car beyond repair and himself only slightly.

Aside from the Ferraris, the only other car of outstanding interest at the British Grand Prix this year was the four-wheel-drive Ferguson P99, (See page 67) driven in the race by both Stirling Moss and Fairman. The Ferguson is a development by the late Harry Ferguson, who died last year. The G.P. project has been under way for some time under the more direct guidance of Tony Rolt, managing director of Ferguson Engineering, who was once a well-known Jaguar driver and who drove for Rob Walker for six years.

In 1958, Rolt and Walker went up to the Ferguson plant and saw designs for a four-wheel-drive racer. Harry Ferguson at that time wanted Mike Hawthorn to drive. Then the Formula change came along and Ferguson stopped development. Last August Moss, Walker, Rolt and Ferguson again had a conference and it was decided to build the car using either a 2.5-liter or 1.5 Climax engine. It was raced for the first time the weekend before the British G.P. at Silverstone in the Intercontinental race with Fairman behind the wheel. Brake failure forced Fairman to punch the transmission sharply into second gear in order to slow up and the sudden force was too much on the gearbox (don't forget—all four wheels braking on the engine) and a countershaft broke. Its second appearance was better and a once-dubious Moss now feels that there is something to be had here if sufficient development is carried out. Early testing was done with a Dunlop "Maxaret" anti-skid device working on all four wheels, a most desirable item, on paper at least. In actual racing, though, this has been left off, the idea being to get the handling right first before adding this extra "gimmick." The car's performance in the wet is remarkable. Moss at Aintree was clearly two seconds quicker than anyone else on the wet track, and he was using the same braking points with the Ferguson as he was with the Lotus. All in all both Fairman and Moss are pleasantly surprised and satisfied; Rob Walker intends to continue entering the car under his name.

Fairman started the race in the car, came into the pits once to have a fouled plug changed, then allowed the mechanics to push him away from the pits despite the fact that the car does have a self-starter. Ferrari and Cooper then protested this action, and the organizers were forced to follow through. After Moss's Lotus was retired with a broken brake pipe and an engine

Innes Ireland in the Lotus and Graham Hill in the B.R.M. begin to apply power while Brabham sets up Cooper for right-hander.

decidedly off-color, Fairman was called in and Stirling took his place, covering only a few laps before being flagged off the track as a result of the Ferrari-Cooper protest.

The Ferguson was powered at Aintree by the latest Climax Mark II engine and is using a special Colotti-designed gearbox which has been thoroughly checked by the Ferguson shop. Curiously enough this car suffered from a fractured brake pipe in practice at Aintree, the same thing that happened to Moss's Lotus at Rheims and again at Aintree; it's the brake pipe between the calipers. Another point to mention is that the Ferguson organization has a vastly more comprehensive shop than Rob Walker's current establishment in Dorking. The value of this organization to Rob Walker cannot be underestimated and it may well herald the beginning of a new era for his dark-blue cars, which up to now have suffered from the lack of proper facilities to prepare them the way a factory team would or should. One final note on the Ferguson: its weight is amazingly low for such a complex car and Walker tells me that it weighs close to 1030 pounds dry.

Practice for the Grand Prix ended with the organizers officially stating that the first four cars had identical times of 1:58.8; Phil Hill was the first to set this time, followed by Ginther, Bonnier (Porsche), and von Trips. Moss shared the second row with von Trips having done a 1:59 in Rob Walker's Lotus. At 2:30 p.m. the following day, Earl Howe dropped the Union Jack for a field of 30 Formula 1 cars in miserable weather. The track was virtually awash with puddles collecting everywhere. The start itself was hectic enough without the wetness, Moss being bumped twice in the melee, but by the first corner the pack was fairly spread out and Phil Hill's Ferrari was the first through the gate, a huge rooster-tail of spray shooting out behind, followed by Trips, Ginther and Moss.

B.R.M.'s boys, left to right: Graham Hill, Tony Brooks, Wilkie Wilkinson, mechanical chief, and Tony Rudd, the team manager.

BRITISH GRAND PRIX

July 15, 1961, Aintree

75 laps, 3 miles per lap

1	von Trips	Ferrari	2:40:53.6 (83.9 mph)
2	P. Hill	Ferrari	2:41:39.6 (83:5 mph)
3	Ginther	Ferrari	2:41:40.4
4	Brabham	Cooper-Climax	2:42:02.2
5	Bonnier	Porsche	2:42:09.8
6	Salvadori	Cooper-Climax	2:42:19.8
7	Gurney	Porsche	1 lap behind
8	McLaren	Cooper-Climax	1 lap behind
9	Brooks	B.R.M.-Climax	2 laps behind
10	Ireland	Lotus-Climax	3 laps behind
11	Gregory	Cooper-Climax	4 laps behind
12	Bandini	Cooper-Maserati	4 laps behind
13	Maggs	Lotus-Climax	6 laps behind
14	Burgess	Lotus-Climax	6 laps behind
15	Greene	Gilby-Climax	6 laps behind
16	de Beaufort	Porsche	6 laps behind
17	Seidel	Lotus-Climax	17 laps behind

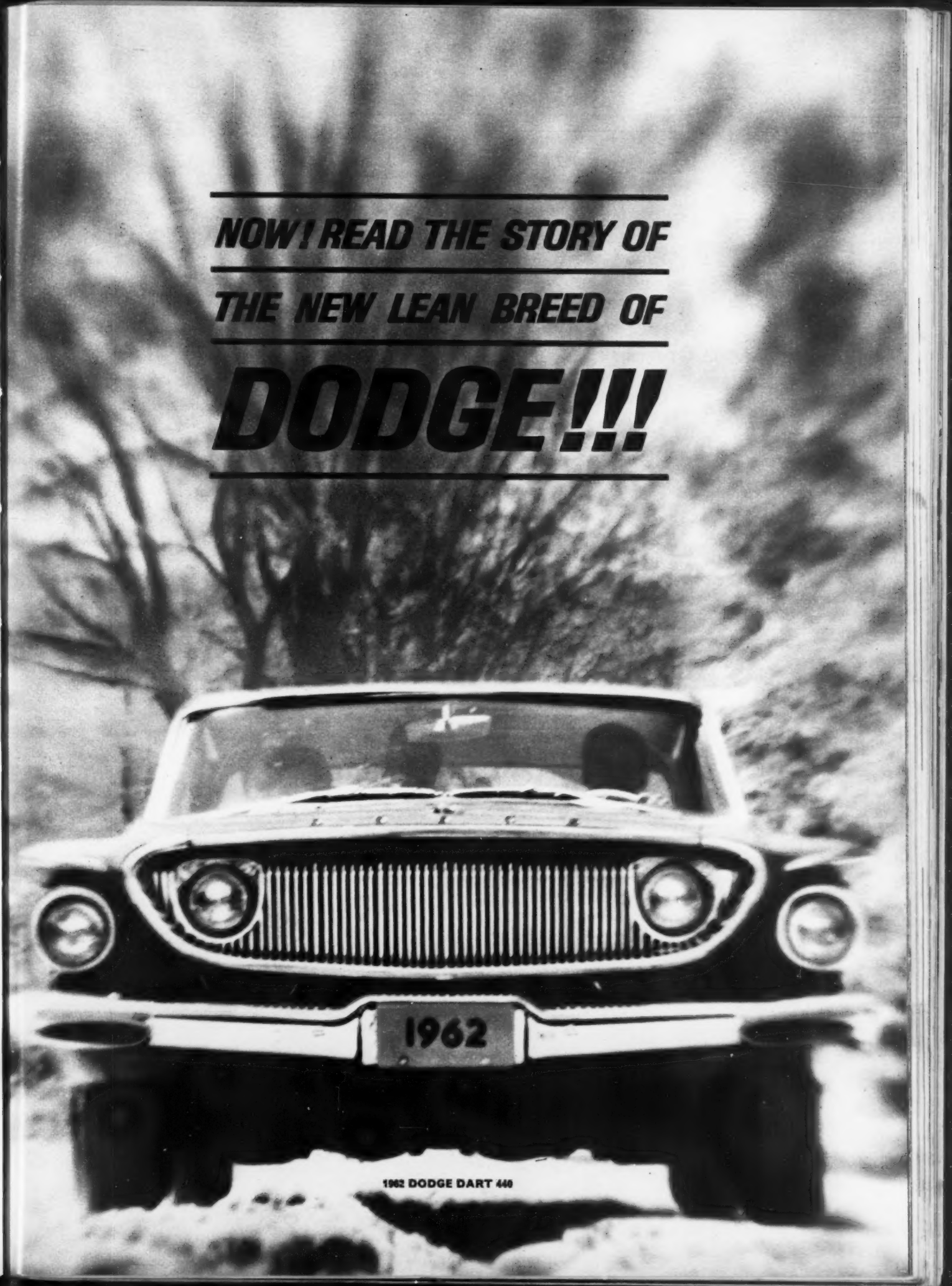
Fastest lap: Brooks, B.R.M.-Climax, 1:57.8, 91.68 mph

Jack Fairman's 4 w.d. Ferguson was black-flagged after earlier being push-started following a pit stop for ignition troubles.

Hill stayed in front for exactly six laps. On his sixth he was approaching the fast Melling Crossing bend when, as he braked, he slid into a puddle—the front wheels lost adhesion. He released the brakes but got into more trouble as he had to brake again. The Ferrari got completely sideways as he approached the turn and Phil found himself staring directly into a wooden post, but in the tenths of seconds actually involved he managed to get the car pointed in the right direction again, shot through the gate and was away, having given himself a most frightening moment.

Trips went into the lead as Phil dropped back and then was passed by Ginther. Moss meanwhile was making hay in the rain and moved up steadily—from fourth position to third on lap six, then to second on his tenth lap, hounding Trips, hoping against hope that the German would make a mistake on the wet track and spin off. But this just didn't happen with von Trips driving a steady, regular race both in the rain and after the sun came out. The pressure was off by then. Moss had broken his engine in an effort to take the Ferrari, and had retired. Tavoni put his sign out to hold station and that, in a nutshell, is the story of the race.

Despite Moss's perfect knowledge of Aintree there was still nothing he could do about the Ferrari, even in the wet, for Trips was able to stay just enough ahead of the dark-blue Lotus. Grim-faced and determined, Stirling had probably prayed for rain, his one opportunity to really "do" the Ferraris, and he drove in his usual immaculate, precise way. He gave the spectators a thrill at Tatts Corner, the one just before the pits, when he spun three times in the middle of the wet track. He stayed on the road instead of crashing as Henry Taylor did, the only real casualty of the day. Taylor's Lotus spun just after Melling Crossing (where Phil had his moment), went off onto the grass, collected a sign and slid along a wooden wall, poor Taylor's clothes being virtually *(Continued on page 78)*


NOW! READ THE STORY OF
THE NEW LEAN BREED OF
DODGE!!!
1962
1962 DODGE DART 440

YOU'RE GOING TO LIKE WHAT'S HAPPENED TO DODGE!!!

Make no mistake—you're looking at an ad. But we'd like to acknowledge the help we got from several independent automotive experts—from champion race drivers Rodger Ward and Buck Baker, from ace dragsters Don Garlits and Jack Chrisman, top auto writers Bill Carroll, Max Muhleman and Bill Callahan, economy driver Woody Bell and sports car driver Walt Hansgen. We gave them a couple of new Dart 440's to test and asked for their comments. Frankly, the comments were nearly all favorable. Which didn't surprise us. Dodge Dart is that kind of car. So read on. We think you'll agree: The 1962 Dodge Dart is well worth your time.

DEAD WEIGHT HAS GONE RIGHT OUT THE WINDOW. We've engineered out dead weight. Gone is useless sheet metal, overhang and chrome. Gone is flashiness and fat. What's left is pure muscle—nearly two tons of hard, lean, lusty road machinery. The new Dart 440, with standard V8 and stick shift, accelerates 9% better than last year's comparable model from zero to 60 . . . 12% better from 20 to 80 in direct gear. This is a new breed, born of Dodge dependability, but restless to go. An honest, capable car that hustles, handles and hangs on long after the others leave off.

It's considerate of your comfort. Easy on your budget. And it's built to be the hottest item on the used car lots when you're ready to trade. Its value will hold up because it's built to hold peoples' respect. That's what we were after in '62. That's what we've got in Dart 440—designed by men who are hot for cars . . . for people who are hot to drive them.

MORE LIVE ACTION BECAUSE THERE'S LESS DEAD WEIGHT. Some cars are economy cars, some are pure action. Dart 440 is both—first of the Action-Economy cars.

Early this year, a 1961 Dodge Dart with "Leadfoot" Woody Bell at the wheel got better than 23 mpg in the Mobilgas Economy Run. According to our engineering test data, a comparable model 1962 Dodge, over the same course with the same driver, would do 5% better. In other words, more than 24 mpg.

We asked Woody to test the new model for economy at the Chrysler Proving Grounds, Chelsea, Mich. Weather was less than ideal; wind reading was a high 12 mph and Woody ran into some rain. Still, there wasn't any cold or snow to adversely affect the fuel economy. In Leadfoot's own words:

"I had a 6 with automatic. Strictly stock. I didn't set it up myself. Well, first I went through their regular tests at the Proving Grounds. I wasn't driving for top economy, because I was under strict supervision to drive at certain speeds and in certain patterns. These tests were designed to find what the average guy would get. I went through their stop-and-go simulated city driving test. Stops, starts, acceleration . . . I did 'em all. I still got a respectable 17.1 mpg. Then I ran their cross-country test—up and down hills, sharp turns, blind turns, rough roads. The works! I got 19.8 mpg. And for a full-size car that's plenty good. Then they let me drive nice and easy, the way I do in an Economy Run, and I started getting the figures I really like. I averaged out 24.65 mpg on one run. Then at constant speed 30 mph I got 25.25 mpg; at constant speed 40 mph I got 24.10. That's plenty all right, I'll tell you."

Pensacola Bch. 17

Frankly, we don't think anybody but a pro could get mileage like 24 and 25 mpg. Even so, the figures are a darn good indication of our new car's potential. On the other hand, the 17 and 19 mpg figures do represent a realistic reading of what the average driver can do. Conditions vary, people vary. But there's certainly 5% better economy than last year's comparable model.

Now, here's the kicker. The same Dart 6 will accelerate 7% better from a standing start. That's action and economy in the same car!

"The hardest balance of all to achieve," commented Max Muhleman of the Charlotte News, who covers the hot NASCAR circuit. "This is a real good package."

We asked drag aces Jack Chrisman and Don Garlits to test the Dart 440 for action. Bill Carroll put the watch on Garlits, the current holder of the "1320" record. Garlits drove a 4-door hardtop with 361 cu. in. V8, 3-speed automatic transmission and standard 3.23 rear axle.

"Which isn't exactly a quarter mile or acceleration gear," Garlits remarked.

Still, he clocked in at 15.4 in the quarter mile. And an amazing 8.1 from 0-60.

"Quite a bomb!" Garlits remarked.

"It really goes," said Chrisman, who got comparable figures the day before.

And, remember, the gearing was strictly standard. The car was also equipped the way most people want a car. Fair enough? We think so.

"I'm amazed at the performance of the car," said Buck Baker, twice champion on the NASCAR circuit. And we were amazed at Buck. After a trial lap or two, Buck stomped on it and took Dart 440 up to 130 mph on the Utica Proving Grounds circular track. Buck said he could do a lot better, but we were glad to let good enough alone. Speeds like that may point to a car's potential . . . but they're for race drivers only.

Some cars boost their performance, some their economy. It's seldom a car boosts both at the same time. It's not a secret how we did it. We took a long, hard look at our car and began to engineer out dead weight. We took 60 lbs. from the automatic transmission with V8; the housing is aluminum. We engineered 5 lbs. from the starter. We eliminated excess chrome and overhang. Every ounce and inch that didn't work...went out. We left only the working weight.

"Very necessary," remarked ace sports driver Walt Hansgen. "It's one thing we haven't done in our country up till now."

With a remarkable new power-to-weight ratio (as much as 1 horse for every 11 lbs.), we made progress through the entire driveline. Take axle ratios. By throwing out dead weight, we lowered the ratios for economy without affecting the zip a bit. The new standard axle for the standard "6" with automatic transmission is 2.93:1. Last year's was 3.31:1. Quite a difference! Axle ratio for the standard V8 with automatic is a gas-squeezing 2.76:1. Last year's was 2.93:1. Axle ratio for the standard V8 with stick shift is a snappy 3.55:1. At take-off or top-end this one really moves.

Frankly, our standard axles are selected with economy in mind. If you want more action, check the chart on the next page. Getting the right axle, we believe, is as important as choosing your engine and transmission. Whatever you choose, our axles are geared with mathematical precision to give you the utmost satisfaction—the action you want, economy you'll like.

ACCELERATION FIGURES.

Don Garlits driving Dart 440 4-Door Hardtop, 361 cu. in. V8, automatic transmission, 3.23 standard rear axle. Radio, heater, power steering, power brakes. Odometer reading at test: 1079.8. (Speedometer error: Approx. 1 mph).

0-30 . . . . . 3.8 sec. 0-45 . . . . . 5.4 sec.
0-60 . . . . . 8.1 sec. 0-80 . . . . 12.1 sec.

STANDING START, ¼ MILE IN 15.4 SEC.

1962

THE TAKEOFF WILL SOCK YOU BACK IN THE SEAT. Many experts have considered the Dodge TorqueFlite 3-speed transmission as the finest transmission in the industry. Yet we've improved on it with a new automatic that works on the same proved principles, but the internal construction is all new. The case is aluminum. Besides being 60 lbs. lighter, the new transmission is more compact. Reduces the floor hump, increases passenger space. It takes off trigger-fast, pours out the power in a steady surge.

"Interesting type of acceleration," remarked auto authority Bill Carroll. "Extremely smooth, and though I could feel the transmission shift, there was no objectionable jerk as in the past from high performance transmissions. Pushed me back against the front seat . . ."

"It changes up smoothly," said Walt Hansgen. "There's plenty of go from the bottom."

THE PAYOFF IS IN THE POWER PLANT. Your choice starts with the 12-port standard 6, whose larger, more efficient manifold takes in more air, gets more go from every drop of gas. And it uses gas by the drops, not the buckets. There's a choice of three free-breathing, hard-charging V8's: standard 318 cu. in. V8 that uses regular gas; optional 318 cu. in. V8 with power-pack; and optional 361 cu. in. V8 with 4-bbl. carb, duals and a special cam. (See chart below for the lineup; turn two pages for engine specs). You'll be hearing from these engines in '62. From carb to cam, they really run.

In summing up its performance, Rodger Ward said: "I ran it flat out, and that Dart really storms! You just sit there and let her track."

THIS ONE OUT-CORNERS, OUT-LASTS, OUT-RIDES ANY FAT CAT CAR AROUND

Dart 440 is probably the easiest handling production car you've ever driven. Corners like a cat. Tracks flat and level through curves. Steers with

DART 440 POWER TEAM LINEUP

Engine and Transmissions

Axle Ratios (S—recommended standard ratio for normal operations; E—optional special economy ratio; P—optional performance ratio; A—available).

(With manual transmission)	2.76:1	2.93:1	3.23:1	3.31:1	3.55:1	3.91:1
145 hp 225 cu. in. 6, standard on all 440's				S	P	A
230 hp 318 cu. in. V8 w/2 bbl carb., standard on all 440's			E		S	P
305 hp 361 cu. in. V8 w/4 bbl carb., optional			S		P	
(With automatic transmission)						
145 hp 225 cu. in. 6, standard on all 440's		S		P	A	
230 hp 318 cu. in. V8 w/2 bbl carb., standard on all 440's	S		P			
260 hp 318 cu. in. V8 w/4 bbl carb., optional	E		S			
305 hp 361 cu. in. V8 w/4 bbl carb., optional	E		S			

*4.10, 4.30, 4.56, and 4.89:1 are special competition ratios, dealer-installed.

Additional high performance equipment available from independent manufacturers:
Auto Marine Laboratories, Wyckoff, New Jersey (transistor ignition). ■ Camcraft, 6120 Casmer, Detroit, Michigan (cams). ■ Edelbrock Equipment Co., 4921 W. Jefferson Blvd., Los Angeles 16, Calif. (manifolds). ■ ForgeTrue Pistons, 1979 E. Colorado Blvd., Glendale, Calif. (pistons). ■ Hedman Hedders Co., 11039-49 W. Washington Blvd., Culver City, Calif. (manifolds). ■ Hurst-Campbell Inc., 341 W. Glenside Ave., Glenside, Pa. (shift conversions). ■ Ed Iskenderian, 607 North Englewood Ave., Inglewood, Calif. (adj. push rods). ■ Offenhauser Sales Corp., 5156 Alhambra Ave., Los Angeles 32, Calif. (manifolds). ■ Weiand, 2733 San Fernando Road, Los Angeles 65, Calif. (manifolds). ■ Howard Cams, 10122 South Main, Los Angeles, Calif. (cams).

needle-point precision. Sits snug and solid.

In '62, we refigured the suspension geometry, striking a perfect balance between solid handling and a smooth ride. Race driver Rodger Ward had this to say:

"You don't get the mushiness you feel in most passenger cars. When you go into a turn hard, she's with you all the way. The car finds its groove naturally. Real stable on the high speed stuff. You can put it just where you want it."

Here's what we did. We reduced the wheel camber to soften the ride a bit. We stiffened the rear section of the rear springs to assure rock-solid handling. We made the front section more flexible to soak up more road shock.

TORSION BARS UP FRONT, OFF-CENTER LEAFS IN REAR. One thing we didn't change is the inherent balance between the better-than-ever torsion bar front suspension and the off-center rear leaf springs.

"Leaf springs in the rear and the torsion bar give you stability . . . and good balance all the way," observed veteran writer Bill Callahan. "The car tracks beautifully."

"It's the most responsive, nimble, full-size car anyone has made yet," said Max Muhleman. "You can whip it around and it handles easily in tight places. Then you take it on the open road and it smoothes out like a big boat. It's unusual to get that balance—a car you can hook around in town and that's great on the highway, too. This one gives you both. Versatile is the word for it."

You'll like the steering. Dart 440 offers an all-new manual steering gear. It features a recirculating-ball design and low-internal friction achieved through use of needle bearings in the cross shaft. Gear ratio is 24 to 1. Overall ratio of the steering system is 28.7:1—for improved steering response. With this new low-friction design, and with less dead weight on the front wheels, steering effort is exceptionally low.

"You could steer it all day and never get tired," remarked Woody Bell. "At first, I thought it was power steering."

"The steering doesn't trick you on any kind of surface or incline," Muhleman said.

THE BRAKES ADJUST THEMSELVES. Dart 440 has new brakes this year. Self-adjusting. You just back up, and the brakes adjust themselves automatically. It's unnecessary to have them adjusted periodically. The brakes feature bonded linings—195.2 effective sq. in. That's 11.2 sq. in. more than last year or 20% more lining area per pound of car than last year's comparable model. A significant improvement! Here's what Walt Hansgen observed:

"I put the brakes on hard. They pulled very dead and dead straight. There was adequate brake at the end of the braking. No fade. That's what we need in motoring today . . . good brakes. Dart's brakes seemed very good."

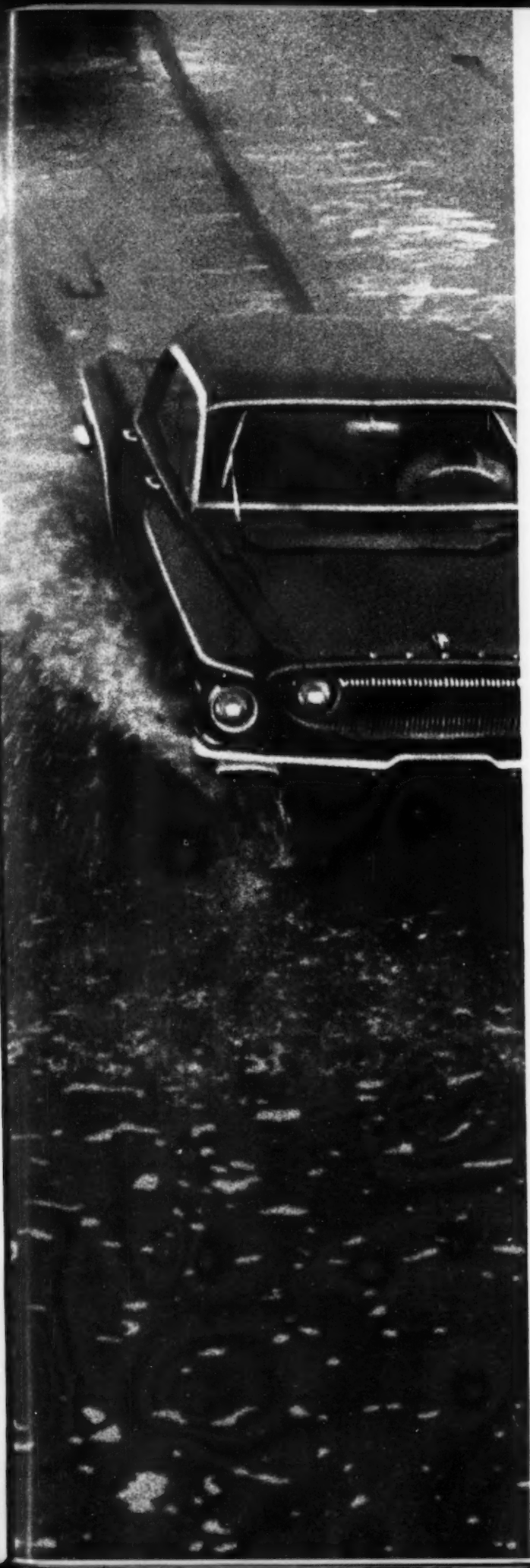
"They're nice to the touch," said Muhleman. "Not much travel in the pedal."

In fact, in summing up the car's driving characteristics, Muhleman added: "You could win a trophy in a ¼ mile and carry home a crate of eggs without worrying about breaking them."

DEPENDABILITY DOESN'T HAVE TO BE DULL

The '62 Dart 440 is proof of that!

Whether you keep your car for a day or a decade, you expect dependability and durability. Who, after all, wants to drive around a bucket of bolts, even for a day? Dodge is famous for building dependable cars. And as you can see from the foregoing pages, dependability doesn't have to be dull. Not if it's a Dart 440. Dodge builds 'em tough. Tight . . . to keep them quiet. To protect



your investment however long you keep your car. The name Dodge on a car is your assurance of lasting dependability.

The body is fully rust-proofed. Some car makers spray, some dip, some use galvanized steel. Dodge uses all three. You get protection deep down, from top to bottom. Inhibit rust . . . and you step up resale value, cut down upkeep.

The body is unitized. No body bolts to shake loose. Each section is seamed and spot-welded to provide a safety-girder structure of massive strength for greater torsional rigidity. A unitized body beefs up the strength while it trims the fat. Permits a lower floor, natural seat height, more interior room.

GOES 32,000 MILES BETWEEN GREASE JOBS. That lube job every 2,000 miles is a thing of the past. On Dart 440, chassis lubrication fittings have been removed from all points on front suspension ball joints, steering linkage connections, and clutch torque shaft bearings. These points are pre-lubed and sealed at the factory. Ball joints and tie rod ends are fitted with neoprene seals that retain the lubricant and exclude dirt or water. In place of grease fittings, ball joints have plugs that can be removed for lubrication every 32,000 miles. Tie rod ends are sealed for life, require only periodic inspection. If you drive 1000 miles a month and keep your car for 60,000 miles, figure on saving from $30 to $45 on lube bills alone. Keep the cash. It's on Dodge.

YOU'LL KNOW IT'S A DODGE WHEN YOU TRY TO WEAR IT OUT. Check the little things: how we use galvanized steel for body side sills for extra rust protection; how we've installed an entirely new starter that kicks off faster and puts less drag on your electrical system. How the Alternator keeps your battery charged for fast starts even in foul weather. Battery lasts longer too. Little things? Not really. They show

you how we build cars. Tough. Dependable. Here's what dragster Jack Chrisman said:

"We gave that Dart 440 a good pounding—the kind that would break up some cars. But this one was as quiet and smooth as when we first got our hands on it."

Said Rodger Ward: "It's a tight piece of machinery without a lot of softness or foolishness."

EVEN THE FINE PRINT IS EXCITING WHEN IT'S A DODGE

Wheelbase 116". Overall length 202.0". (Wagon 210.0"). Turning diameter 40.3 ft. (curb to curb). Tread: front 59.4"; rear 57.5". Total width of car; 76.5". Wheels 14". Safety-Rim. Brakes: 10 x 2½", hydraulic, self-energizing. Bonded linings, 195.2 sq. in. effective lining area. Power brakes optional. Parking brake foot-pedal operated, activating shoes on each rear wheel. Tires, tubeless, 6.50 x 14" (6 cyl.), 7.00 x 14" (V8 and all wagons). Steering system: Low-friction manual gear. Overall ratio 28.7:1. Number of turns 5.3. Power steering optional at extra cost. Shocks—direct acting, Oriflow. Electrical system: 12-volt, 6-cell battery. Single speed electrical windshield wipers. Variable speed, electrical wipers optional at extra cost. Heater-defroster, optional. Pushbutton operation for heating, defrosting, ventilating. Forced air ventilation from axial flow blower. At standstill there's as much ventilation as at 30 mph with a conventional system. Interior: 5 color schemes to choose from in Dart 440 series. Lustre-Bond Enamel Finish; 15 exterior solid color choices. 33 two-tones.

Transmissions. Manual. Standard 3-speed. Stick mounted on steering column. Ratios with "6": 2.95 to 1, 1.83 to 1, 1.00 to 1. 3.49 to 1 reverse. Standard axle 3.31 to 1. With V8: 2.12 to 1, 1.43 to 1, 1.00 to 1 and 2.73 to 1 in reverse. Standard axle 3.55 to 1. Automatic. 3-speed, pushbutton control. Ratios with "6" or V8: 2.45 to 1, 1.45 to 1, 1.00 to 1 and 2.20 to 1 reverse. Axle, with V8, 2.76 to 1; with "6", 2.93 to 1.

Engines. 318 V8 standard on all Dart V8 models. OHV, 318 cu. in. Bore, 3.91". Stroke 3.31". Compression ratio 9 to 1. H.P. 230 at 4400 rpm. Torque 340 lbs. at 2400 rpm. Dual downdraft carb. Shunt type oil filter. Oil capacity 4 qts. (5 qts. when changing filter). Coolant capacity 20 qts. without heater. 318 V8 with power pack. Same as preceding, except with a 4 bbl. carb., high performance cam, dual exhausts. 260 H.P. at 4400 rpm. 345 lbs.-ft. at 2800 rpm. Available at extra cost only with automatic transmission on all Dart models. 361 V8. Available at extra cost on all Dart models. 361 cu. in. Bore 4.12". Stroke 3.38". Compression ratio 9 to 1. H.P. 305 at 4800 rpm. Torque 395 lbs. at 3000 rpm. 4-bbl. carb. High performance cam. Dual breaker distributor. Dual exhausts. Full-flow oil filter. Oil capacity 4 qts. (5 qts. when changing filter). Coolant capacity 16 qts. without heater. 225 Slant 6. Standard on all Dart 6 models. OHV, 30° inclined. 225 cu. in. Bore 3.40". Stroke 4.125". Compression ratio 8.2 to 1. H.P. 145 at 4000 rpm. Torque 215 lbs. at 2800 rpm. Single downdraft carb. Full-flow oil filter. Oil capacity 4 qts. (5 qts. when changing filter). Coolant capacity 12 qts. without heater.

INDIVIDUAL COMFORT AND HONEST LUXURY

How do you get the comfort of a bucket seat along with the room you need for passengers? We think we've got the answer.

Up front there's a fold-down center arm rest. Standard equipment on Dart 440. Carrying four or five? Flip the arm rest down and you've got

the security and comfort of a bucket seat. Carrying six? Just flip it up again. You can literally tailor your interior to your passenger load.

"I like the split seat back," said Walt Hansgen. "The fold-down arm rest keeps you from sliding across the seat in a hard turn."

"I never thought an arm rest could be of any value," remarked Muhleman. "But this one was the right height. You can drive and rest your arm at the same time. It gives you a feeling of compactness at the wheel. The wheel, driver and seat are a package, an entity all their own."

Is Dart 440 roomy enough? We asked Bill Carroll, who's 6 ft. 1½ in. tall. "I appreciated the increased headroom," he said. "There's also more room in the back seat than I've seen in a hardtop for many a year. The instrument panel has been moved forward which increases the room. There's room inside for six people."

Max Muhleman is also a six-footer. "I had no trouble getting in or out of the car," he reported. "I was perfectly comfortable in driving position. You just automatically fall into a good position."

Visibility is excellent. "So good," said Muhleman, "the only way you can prevent it is to put travel stickers all over the windows."

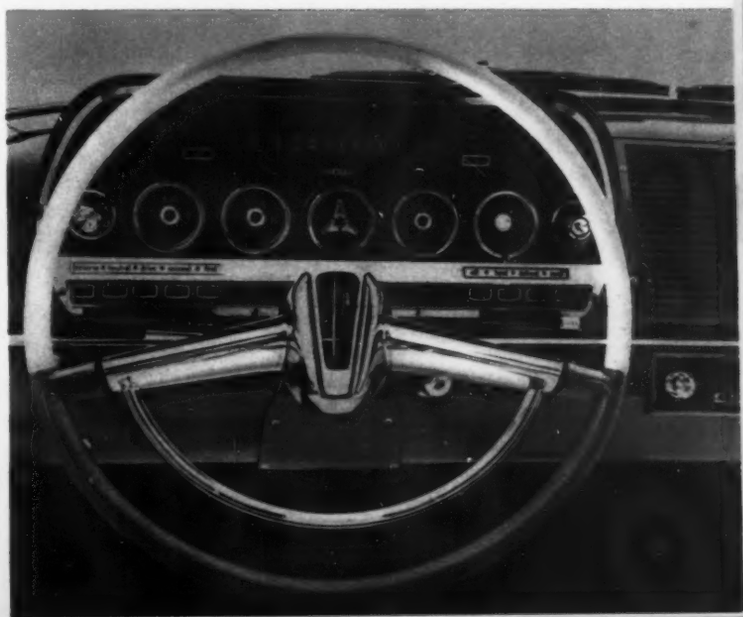
Rodger Ward and Buck Baker were particularly impressed by the over-the-hood visibility. "Helps in tight handling," said Buck.

Bill Callahan noted that on the instrument panel "there's no excess ornamentation. No glare. The instruments are nicely clustered. Easy to read and easy to use."

There are pushbuttons for the automatic transmission, radio and heater-defroster.

The drivers and writers alike appreciated the new temperature gauge. It's a true gauge. "Shows you if it's running hot and how hot," said Muhleman, "except the car doesn't seem to run hot."

As for luxury, take a look. All vinyl fabrics on door panels mould right up to the windows. Deep carpeting sill-to-sill. Vinyl seats. Pleated.



Plush. Durable and easy to clean.

"I never liked vinyl to sit on before," said Muhleman, "but this one is good." One reason: better air circulation and cooler riding comfort thanks to sewn piping on seating areas.

Here, then, is honest luxury plus comfort that treats you like an individual. The kind of interior we think belongs in a car you'd respect.

"They went all-out to make that interior nice," observed Don Garlits.

He's right. It's the best we've ever offered.

GET ACTION-ECONOMY IN SIX HOT MODELS

As you might expect, Dart 440 comes in all the popular body styles. A 2-door hardtop, 4-door hardtop, convertible, 4-door sedan, and two station wagons—six and nine passenger.

Whichever you choose, this new breed is built to go. Far and hard. Short and sweet. Every part has function. Every line serves reason. Here's what auto authority Bill Carroll had to say:

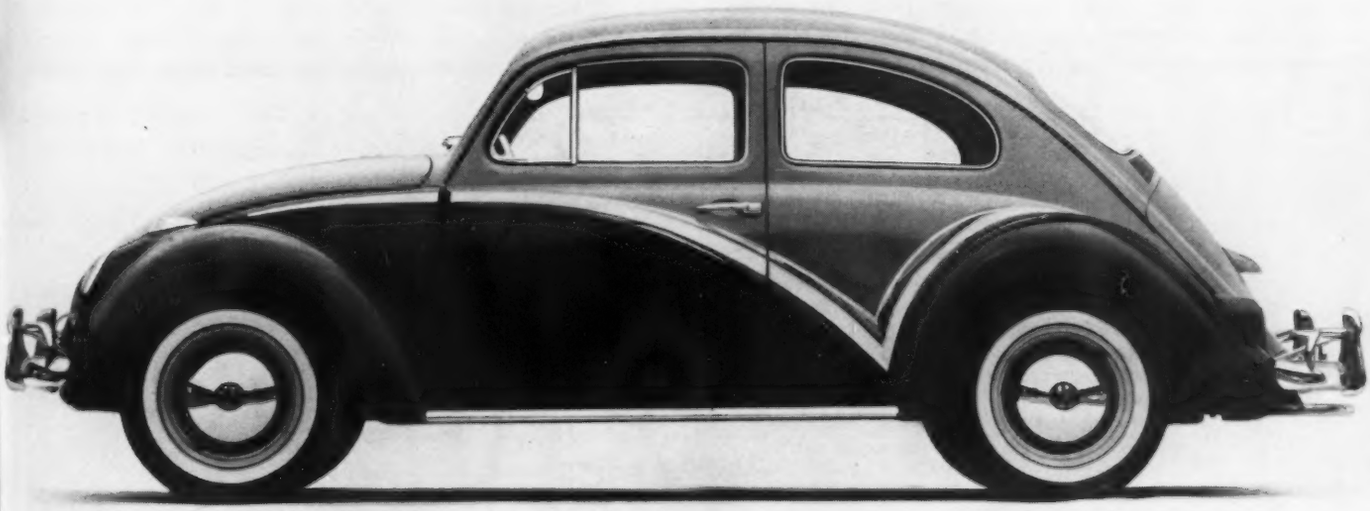
"The car has continental styling—a long hood, a flair all its own. Dart 440 extends the trend toward a car with a sporty appearance, and performance above and beyond the ordinary. I think it will find instant appeal among the public."

That's Dart 440 for you. Six hot models. Choose the one that suits you best. You've got to try what's happened to Dodge.

DRIVE THE NEW LEAN BREED

AT YOUR DEPENDABLE

DODGE DEALER'S.



©1961 VOLKSWAGEN OF AMERICA, INC.

Never.

We'd no sooner make an over-chromed, two-toned Volkswagen than we'd change the classic beetle shape.

It's not that the chromed version looks so bad; it just doesn't make the car work any better.

That's the rule of thumb we go by: we change the VW only to improve it, not to make last year's model look obsolete.

In 1961, for example, we were able to get more horsepower from our air-cooled engine without making it any bigger or less economical.

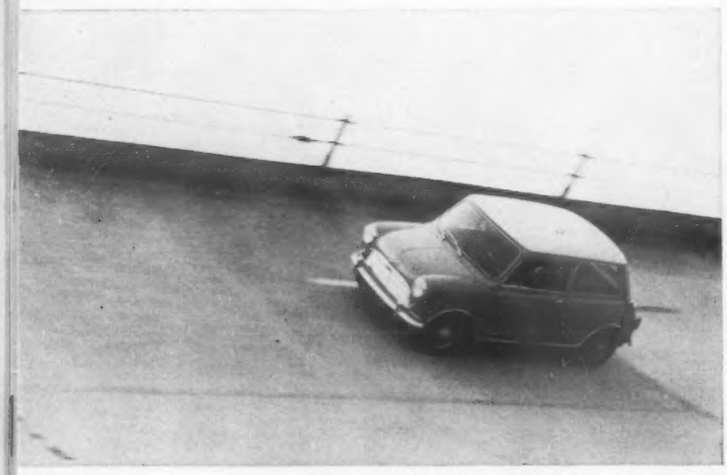
(One thing did get bigger this year: the tail lights.)

Everything on the VW happens for a reason; nothing is for show.

We don't even have a chrome piece that spells out our name.

We do have a little round emblem with our initials on it, though.

After all, we can't let 600,000 Americans go riding around in unidentified cars.



MORRIS-COOPER

John Cooper and Alec Issigonis combine to produce Britain's newest high-performance small car based on the front-drive BMC 850.

• In the two-year lifespan to date of BMC's front-drive twins, known in Britain as the Morris Mini-Minor and Austin Seven but sharing the designation "850" in the States, the makers themselves have stood aloof from endeavors to boost the performance of these cars' laterally-disposed engines. But now, on initiative supplied by Charles and John Cooper, father and son, of Cooper Cars fame, they've committed their resources and prestige to oversize-engined and otherwise significantly modified f.w.d. babies as supplements to the existing Morris and Austin ranges.

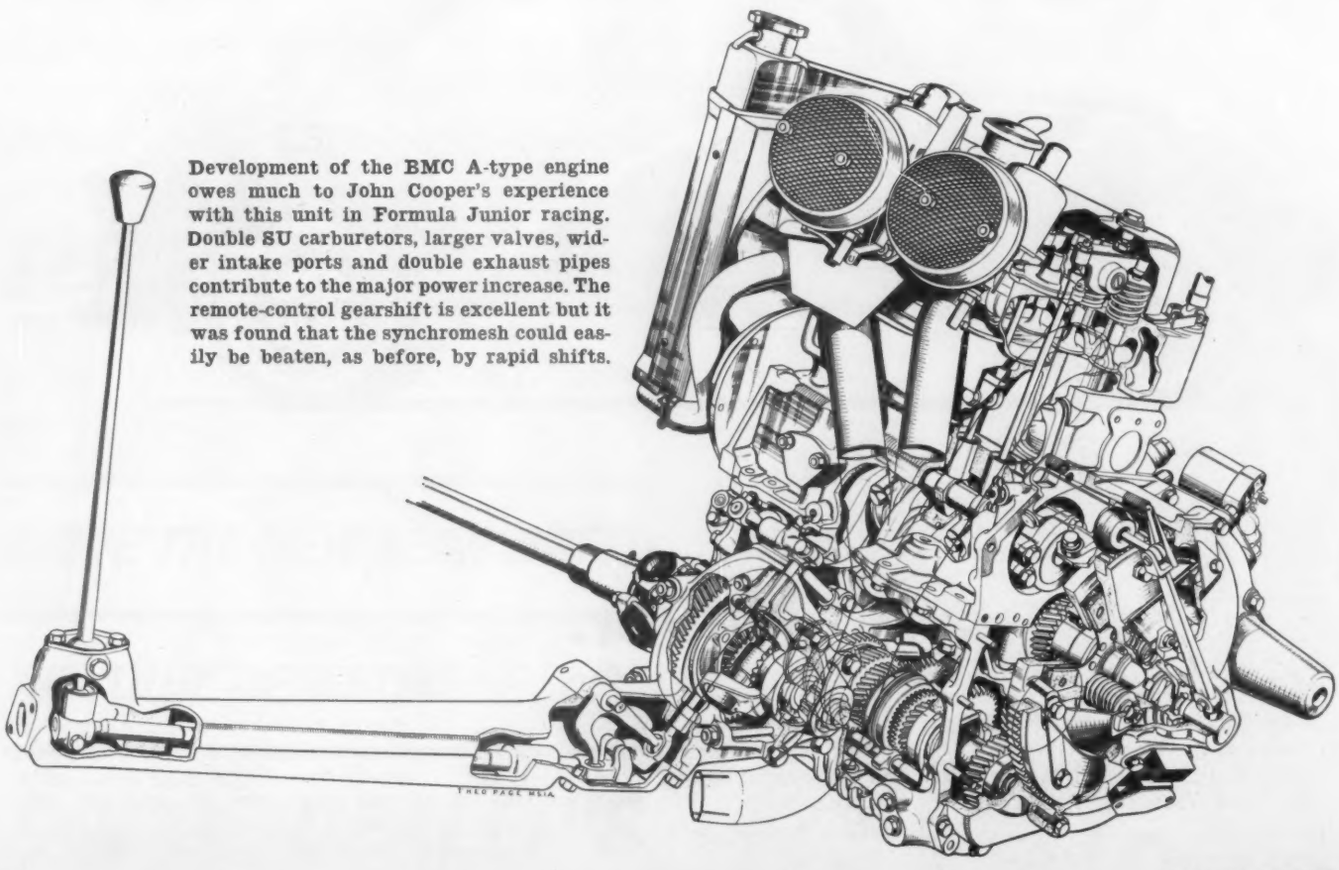
With displacements crowding the 1 liter class limit (997 cc to be exact) these G.T. miniatures have outgrown the "850" label and are being marketed internationally through established BMC channels as the Morris Mini-Cooper and Austin Seven Cooper. ADO50 is their factory symbol.

Comparison between the performance table on this page with CAR AND DRIVER's test report on the Austin-Healey Sprite II (July, 1961) puts the writing on the wall for owners of BMC's alike-in-all-but-name A-H Sprite and MG Midget. To outspeed and outaccelerate Sprites and Midgets at minimal expense, the tool you're going to need is a dinky sedan with the Cooper suffix. As for the latter's margin of superiority over the basic 850, a typical example is a saving of over ten seconds in the zero to 60 mph range.

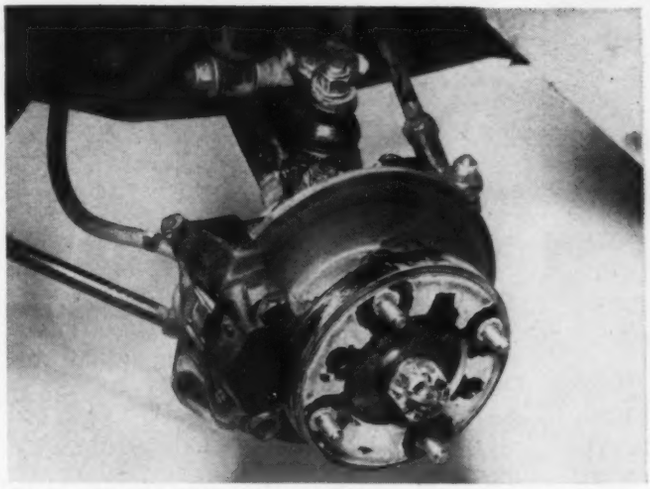
So how is it done?

Primarily, of course, it's a matter of cubic inches, but there's much more to it than that. Other contributors to an output of 55 bhp net at 6000 rpm—up from 34 bhp at 5500—are a Sprite-type cylinder head, new pistons giving a c.r. of 9 to one, oversize intake valves and enlarged ports, double valve springs, a special camshaft advancing valve overlap from 15 to 37 degrees, a free-flow exhaust system of increased bore and with a straight-through muffler. To aid initial acceleration, flywheel weight has been pruned by about four pounds, with the cut concentrated at the rim for maximum effectiveness.

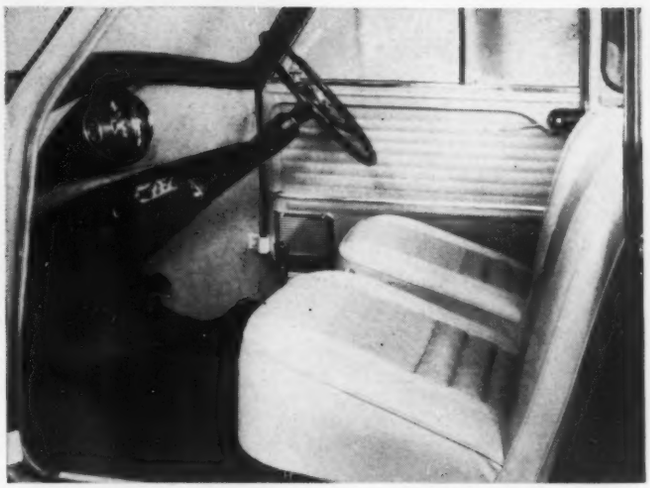
Bore and stroke both are changed, but a curious fact, to which BMC doesn't draw attention, is that the former is reduced rather than stretched (the 850's bore is 2.48), resulting in an unfashionably "long" 1.3/1 ratio of S/B. Reason for this is obscure, though it's pointed out that, somewhat obviously, it affords generous inter-



Development of the BMC A-type engine owes much to John Cooper's experience with this unit in Formula Junior racing. Double SU carburetors, larger valves, wider intake ports and double exhaust pipes contribute to the major power increase. The remote-control gearshift is excellent but it was found that the synchromesh could easily be beaten, as before, by rapid shifts.



Front-wheel brakes are hydraulically-operated Lockheed discs without servo assistance. Total friction area is up by 139%.



The gear lever is conveniently located in the floor tunnel and the photo also shows the redesigned seats and new door handles.

cylinder sealing areas and thus gives an extra safeguard against gasket blowing at the high compression pressures now realized. Nonetheless, it wouldn't be surprising if future BMC projects included over-a-liter versions of this crosswise engine, with bores of at least the original 2.48 inches and possibly more.

The ADO50 has a modified crank with reduced bearing widths to allow room for beefed-up webs. Bearing diameters are unchanged, but a vibration damper is added to take care of the extra 500 rpm and the main bearing material is new: lead-indium bronze.

Cooper experience with BMC engines in Formula Junior racing has been much exploited in designing and developing the ADO50 powerplant. Impressive as its performance is, for its size, BMC engineers emphasize that conservative safety limits have been adhered to throughout. Confirming this, the makers' normal one-year warranty remains effective; it doesn't, of course, apply to engines with independently marketed souping equipment.

In other mechanical respects, the ADO50 differs from the 850s in having disc front brakes (Lockheeds, no servo) and a much-needed remote-control gearshift. The latter has a straight, rigid, shortish lever sprouting vertically from the floor, its root in the approximate plane of the seats' leading edge. Overall gearing is minutely higher than the 850's, representing the difference between the latter's 14.8 and the Cooper's 14.9 mph per thousand rpm in top, and the internal ratios have been revised to close (*Continued on page 80*)

ROAD TEST: MORRIS-COOPER

Price as tested: Not yet available
Importer:
Hambro Automotive Corp.
27 West 57th Street
New York 19, N.Y.

BENJAFIELD

ENGINE:

Displacement	60.9 cu in, 997 cc
Dimensions	4 cyl, 2.46 in bore, 3.20 in stroke.
Valve gear: pushrod overhead valves.	
Compression ratio	9.0 to one
Power (SAE)	60 bhp @ 5000 rpm
Torque	54.5 lb-ft @ 3600 rpm
Usable range of engine speeds	900-6000 rpm
Corrected piston speed @ 6000 rpm	2810 fpm
Fuel recommended	Premium
Mileage	25-36 mpg
Range on 6.5-gallon tank	160-235 miles

CHASSIS:

Wheelbase	80 in
Tread	F 48 in, R 46 in
Length	120 in
Ground clearance	6 in
Suspension: F, ind., parallel wishbones, rubber ring; R, ind., trailing arms, rubber ring.	
Turns, lock to lock	2¼
Turning circle diameter between curbs	29½ ft
Tire size	5.20 x 10
Pressures recommended	F 24, R 22 psi
Brakes; type, swept area: F 7 in disc, R 7 in drum, 263 sq in	
Curb weight (full tank)	1335 lbs
Percentage on driving wheels	60

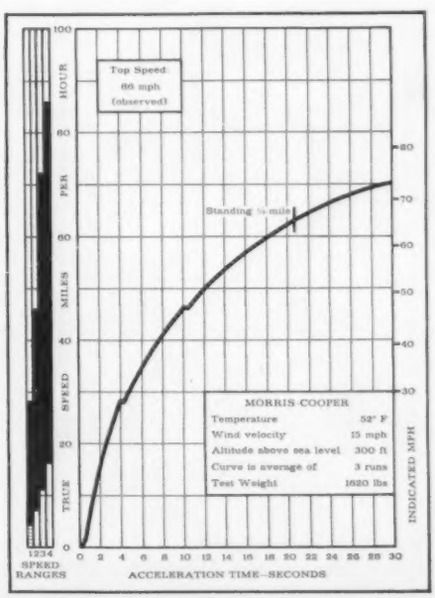
DRIVE TRAIN:

Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	3.20	——	12.04	4.7
1st	No	3.20	67%	12.04	4.7
2nd	Yes	1.92	54%	7.22	7.8
3rd	Yes	1.25	35%	4.68	12.0
4th	Yes	1.00	—	3.77	14.9

Final drive ratios: 3.765 to one standard, 3.444 optional

ACCELERATION:

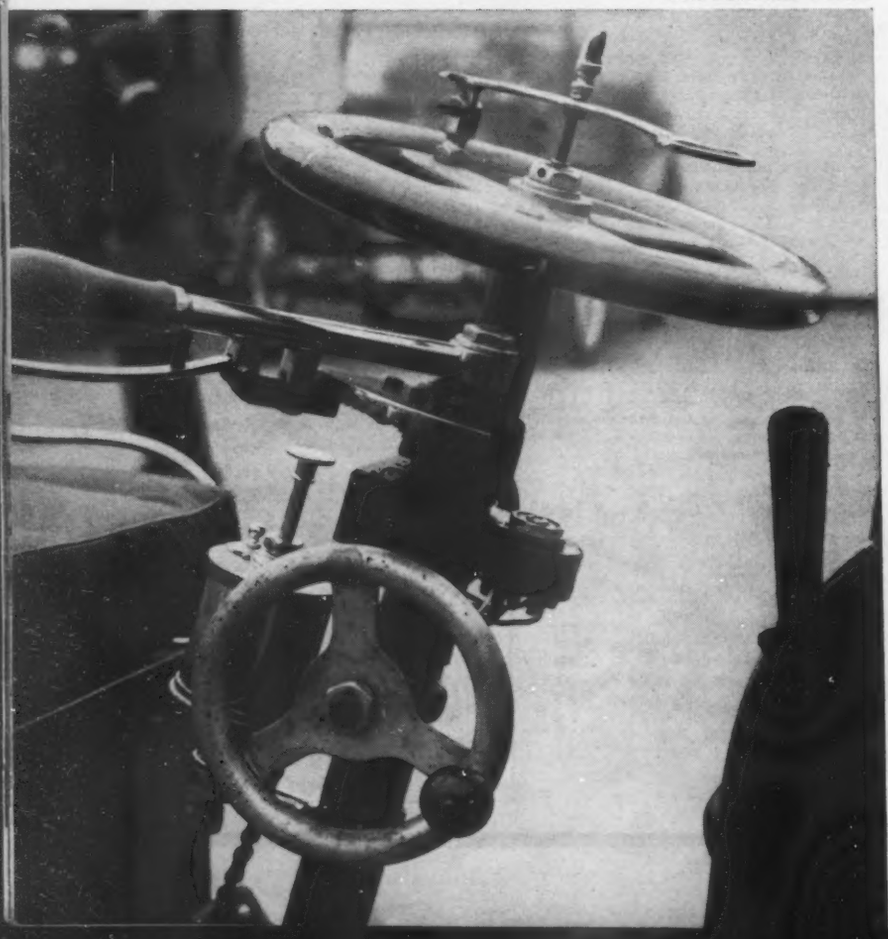
Zero to	Seconds
30 mph	4.8
40 mph	7.8
50 mph	12.3
60 mph	18.2
70 mph	29.6
Standing ¼ mile	20.7



MOTOMETER

1904 ROLLS ROYCE

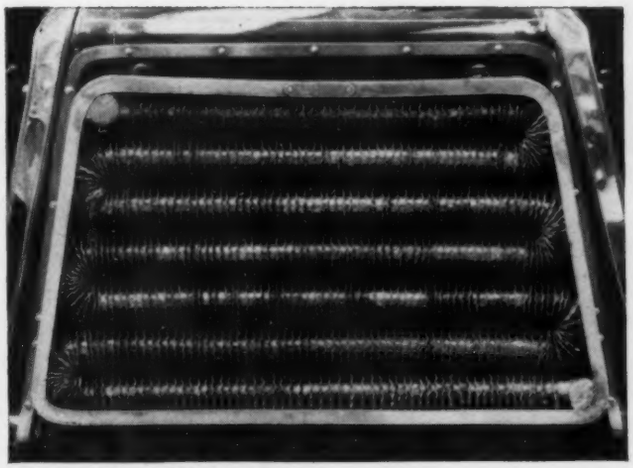
1900 MAURER-UNION



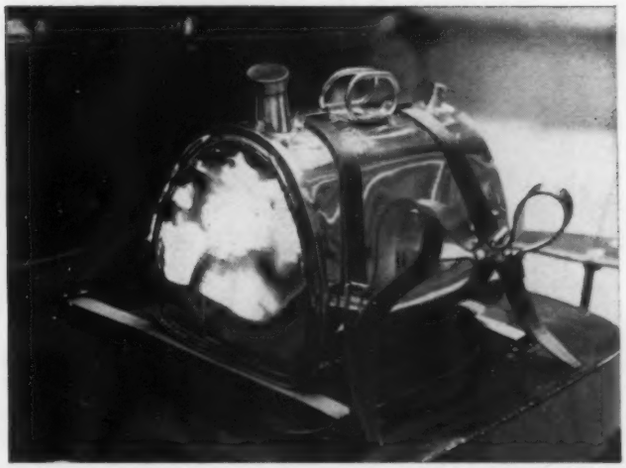
WEITMANN'S WORLD

• Nothing has contributed more pain, pleasure and progress to man than that rolling artifact—the automobile. In honor of the self-propelled vehicle's 75th birthday, Car and Driver's newest Contributing Editor, photographer Julius Weitmann, has enriched these four pages with jewel-like details from early cars. The direct approach was appreciated in the beginning. The motometer was a combination radiator cap and thermometer with the recording end jutting out in full view. The Rolls people did not consider the steering wheel as part of the decor. It had to be big, black with four spokes and brook no nonsense from the autoist. The Maurer-Union firm went Rolls one better and affixed two wheels—albeit working in different planes—on its 1900 model. The smaller controlled the infinitely-variable-ratio transmission! The forest of pedals sprouting from the toe board of the 1901 Mercedes would awe the bravest of modern practitioners. Aside from the three regular ones there are two extras: front brakes and exhaust cutout. De Dion-Bouton builders solved the problem of running out of gas, and produced a minor work of art—like the Panhard radiator—in sheet brass.

CAR and DRIVER

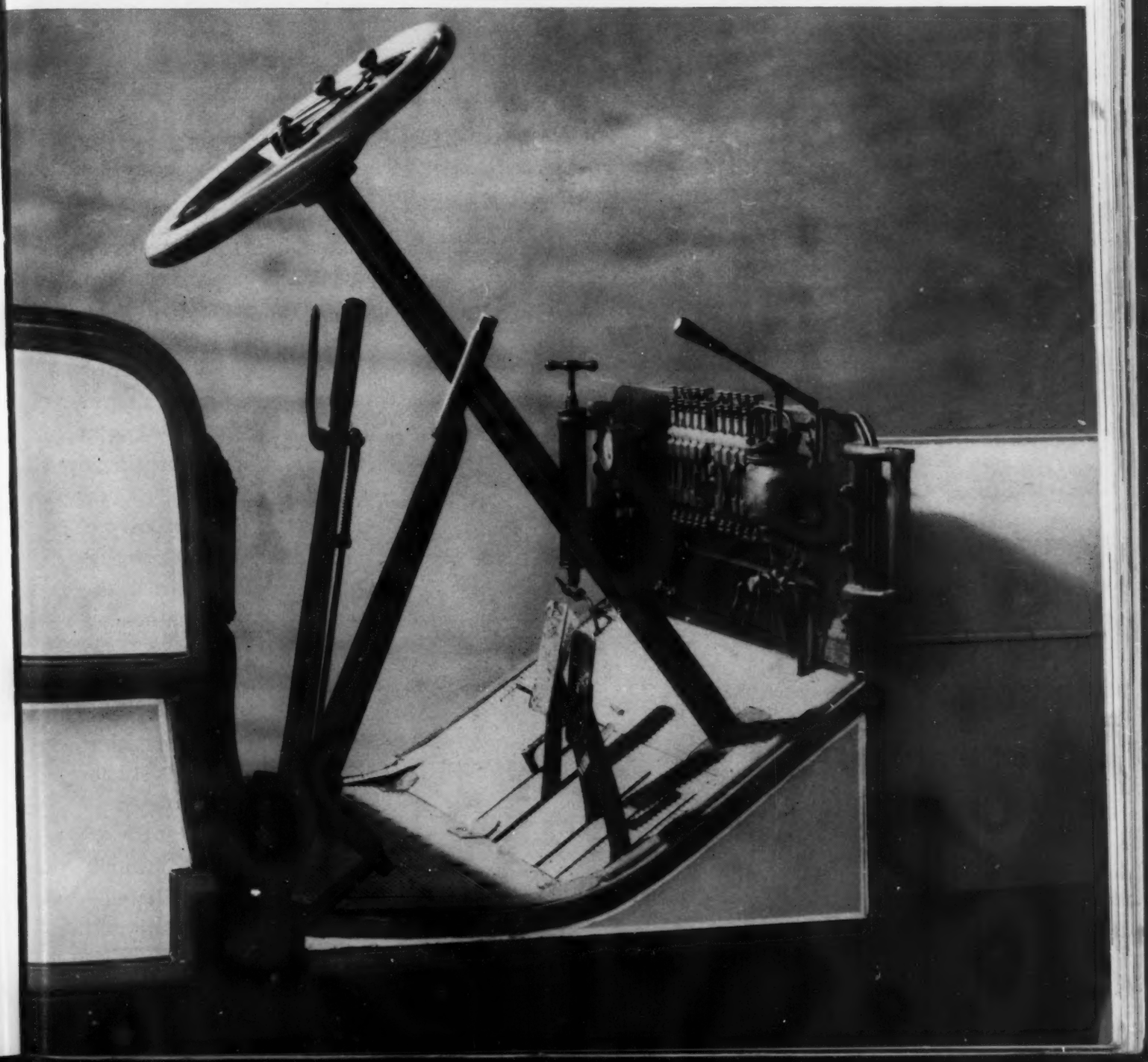


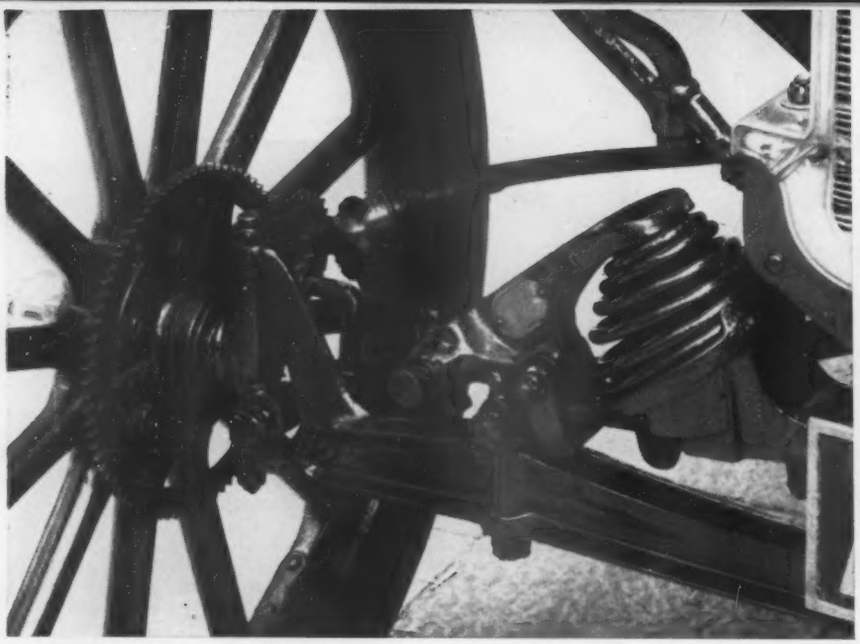
1903 PANHARD ET LEVASSOR



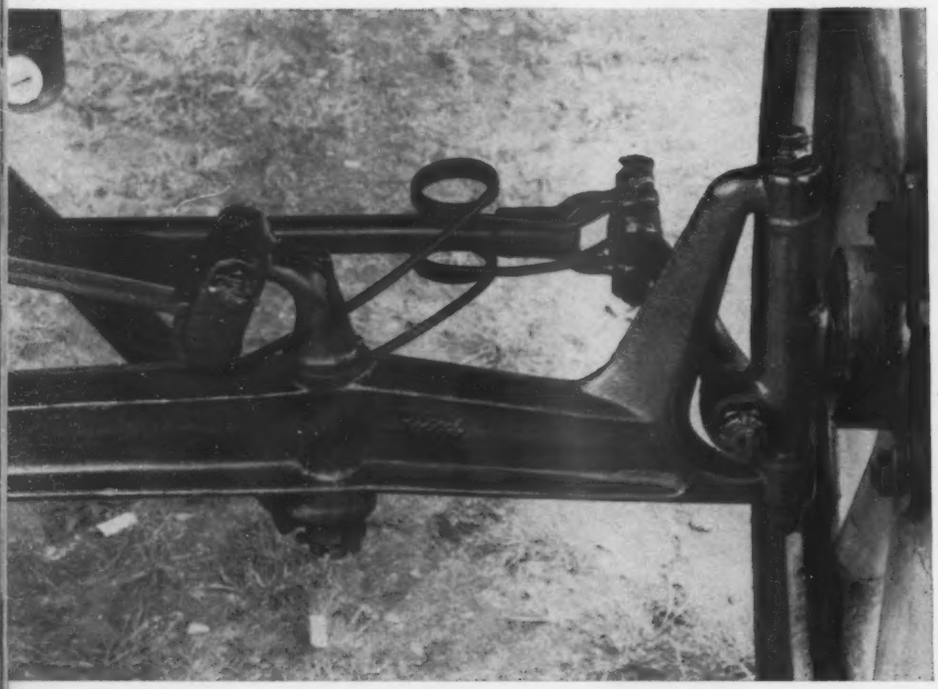
1911 DE DION-BOUTON

1901 MERCEDES SIMPLEX





1914 FORD



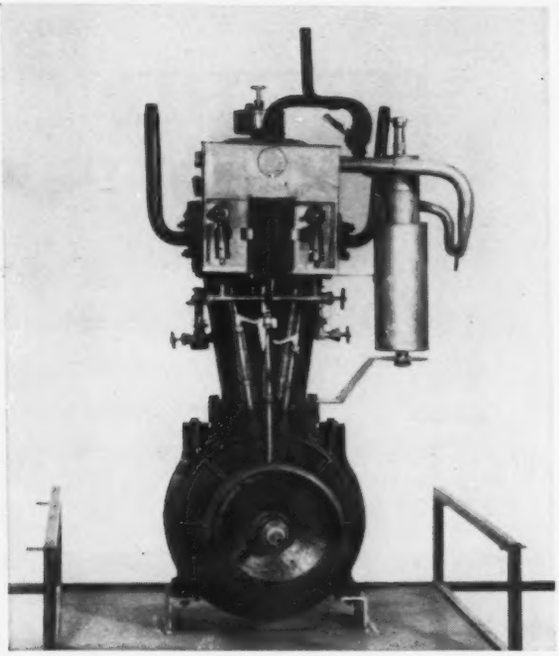
1912 FORD

1928 BUGATTI

Cars roll on wheels, and have done so for 75 years. Ford used his in 1914 not only for this purpose but also to drive his odometer to record just how far they had rolled. In 1912 this complication, along with the optional extra coil spring, was absent. Then they only had to rotate and pivot on the spidery kingpins. By 1928 Bugatti made the front wheels assist in stopping his fine-drawn road cars via artistically cast drums rimmed with fragile-looking fins. With its swiveling turn signal at odds with the locked-over wheels, the 1910 4.5-liter Mercedes commanded the respect of both driver and pedestrian. At speed—an unstoppable 60 mph—with begoggled and mummy-wrapped crew aboard it proved the undoing of many a high-strung horse. The vee engine, in its eight-cylinder form, is now a common item. It wasn't, however, when a tall, thin, rococo-looking engine first saw the light of day and heard a mechanic's curse in the Daimler shops in 1889. It produced 1.4 bhp and powered a tricycle, among other things. Vintage Rolls Royces are different from other vehicles in many ways. One way is exhibited in the carefully nurtured tool chest in which the owner has perpetuated—needlessly—the memory of the two men responsible for this splendid example of the art.

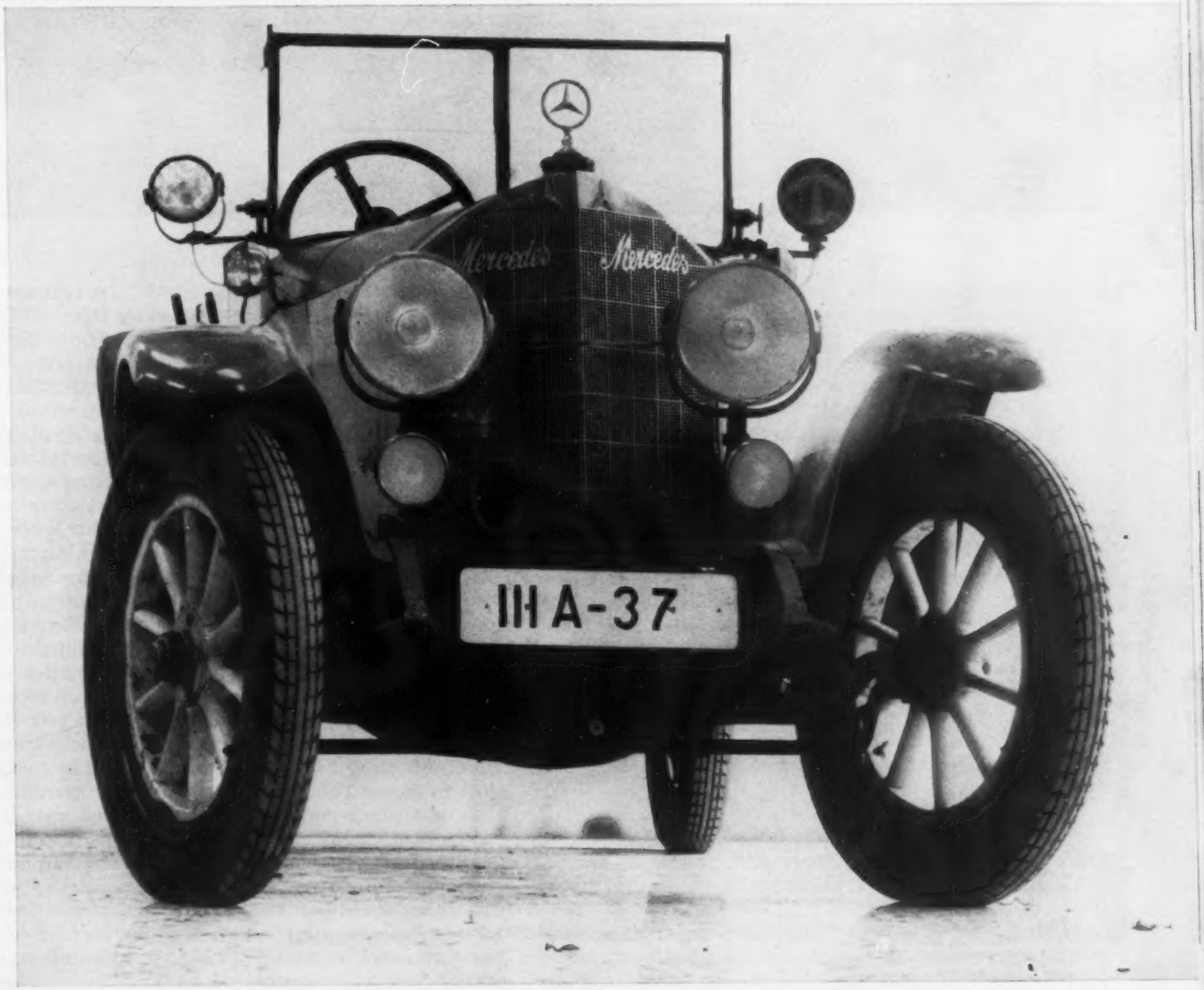
CAR and DRIVER

1907 SILVER GHOST



1889 DAIMLER

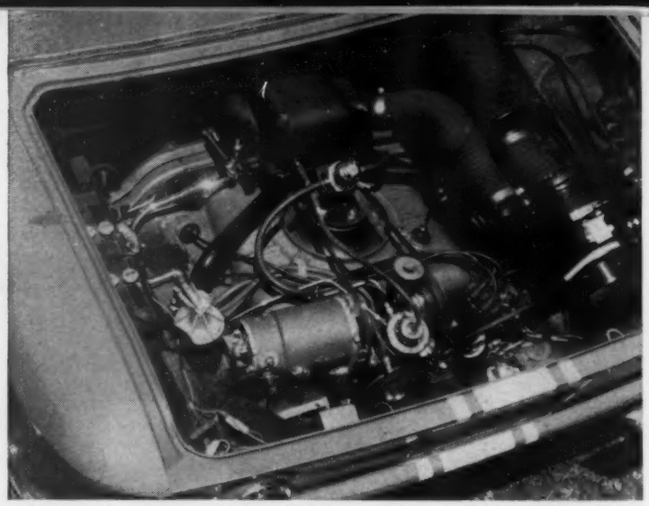
1910 MERCEDES KNIGHT



SEBRING SPYDER

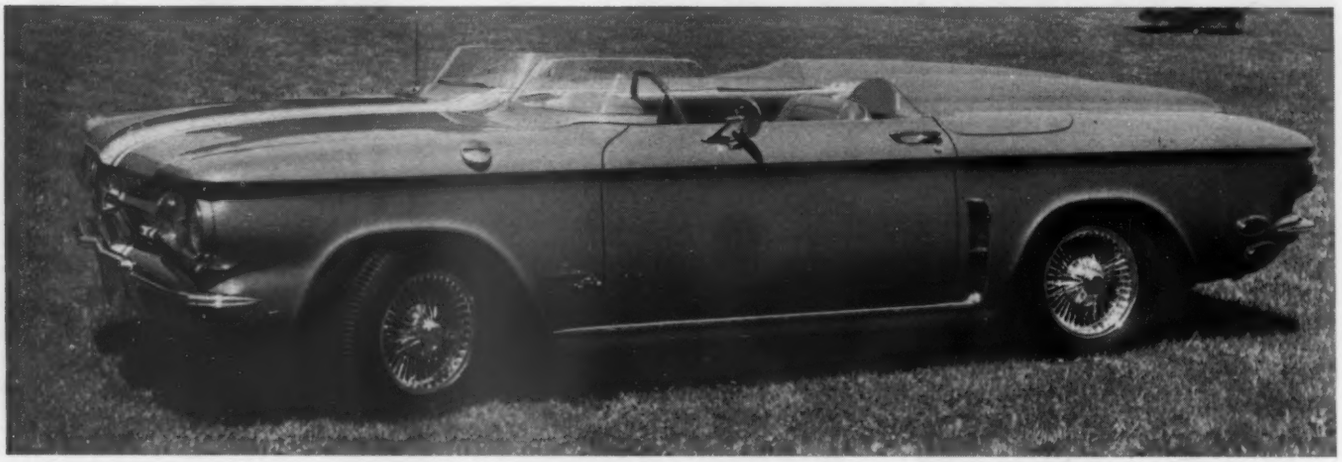
by DIC VAN DER FEEN

Take a Monza, cut off the roof, chop out 15 inches in length, put a real sting in its tail with a Paxton blower, and add dual G.P.-type windshields and you have a line on possible things to come from GM.



Paxton supercharger installation looks like part of the power plant on the Spyder. Blower adds about 32 bhp to stock 98 bhp.

Spyder doesn't really look much shorter than regular Monza until you mentally add 15 inches between wheel arch and door.



• The description of the sparkling car on our cover is officially—and enticingly—a "Corvair-Corvette for the smaller sports car market." Then, just when you get your hopes up, is added the phrase, "and is strictly an experimental car by General Motors Styling."

But we know hope springs eternal in the breasts of car lovers and it is our guess that GM is very definitely interested in finding out how much hope there is for production of this Corvair Sebring Spyder. Bill Mitchell, GM vice-president in charge of styling, has said, in effect, "Here's an idea. Go ahead and react. Who knows what might happen?"

Mitchell started with the standard Corvair chassis and reduced the wheelbase by 15 inches, nearly all of it taken from between the back of the stock door and the rear-wheel arch. Those doors are the only normal Corvair panels on the Sebring Spyder. All the other body pressings are special steel fabrications. The exception is the rear deck. This quick-lift unit is fiber glass and covers not only the engine but the upholstered baggage section behind the seats. The head-rest fairings lift right with it.

Overall length of the Spyder is 162 inches against the normal model's 180 inches but overall width is up from 67 inches to 68½. The Spyder is strikingly low. It measures just 37 inches off the ground at the top of the head-rest fairings.

Just in front of the rear wheel arches are functional scoops for rear brake cooling. Inside are the standard drums which are highly polished internally to complement the sintered linings. The glossy 13-inch chrome wire wheels are offered by Dayton Wirewheel, Xenia, Ohio, and carry Firestone Super Sport tires.

Suspension is the heavy-duty kit now offered for Corvairs and then some. A front stabilizer bar has been installed. The coil-shock combinations front and rear are special setups produced by Delco to suit the hard-cornering abilities of this short-wheelbased chassis. Camber of the rear wheels has also been altered to improve cornering. Two degrees of negative camber is the setting for the Sypder contrasting with the zero running camber of current stock Corvairs.

Attention focuses on the cockpit of the Sebring Spyder. Individual windscreens make it irrefutably a two-seater roadster and lead to a logical permanent division in the seating. An automotive version of the Pennsylvania Dutch "bundling board" is mounted firmly from cowl to rear deck. But there is plenty of room underneath for hand-holding or what-have-you across the space between the two comfortable bucket seats.

GM Styling has had a lot of fun with two other cockpit features. The safety belts retract automatically into an underfloor coil to the right of each seat. Only the end-fitting protrudes when the belt is coiled and it falls naturally to hand. You pull the belt up and across your lap to another convenient floor fitting on the left and sock the end-fitting into place. The result is a solid, flat belt across your middle with no buckles in the way and a quick-release fitting just alongside your seat when you want to un-belt.

PHOTOGRAPHY: PERRIN

Three-quarter front view leaves little doubt as to the Spyder's parentage. Headlight stone guards and twin wrap-around racing screens offer not-so-subtle clues to the car's intended market. None of the styling hurts performance of GM's little sportster.

The doors have hardware that takes its lead from the Corvette but goes one better. The Spyder features three angled lights mounted in the inside panel that automatically pop on with an attention-getting red when the door is opened.

Bill Mitchell turned the engine over to Zora Arkus-Duntov, the Corvette's godfather, who promptly installed the special cam as in the production 98 bhp engine. The engine is fully balanced with all clearances dead-on engineering specifications, and is fitted with —surprise—an awesome Paxton supercharger.

Absolutely nothing was available on power or performance specifications, but we could and did sit behind the wheel and blip the tach to the 5500 rpm mark. The engine wound up so freely we wondered if the accelerator pedal was connected directly to the needle. The red area of the tach is from 5200 to 5800 rpm with the higher mark being the danger point.

Much attention has been paid to the exhaust system with very neat tuning accomplished in an ingenious, undercover manner. The twin pipes from each side of the familiar opposed six run to the opposite side behind the engine but inside the rear body panel before reaching the rudimentary muffler. This gives the necessary length for optimum extraction effect with no abrupt curves in the pipes.

Beyond this, we will have to leave the sexy Spyder with the comment that there is a lot going on under the hood here that doesn't seem to be in GM's Idle Curiosity Department. *—DVdF*

Dished wood racing wheel dominates Spyder cockpit. Instruments include 140 mph speedometer and 7000 rpm tachometer.

• Nobody wants to change the Corvair. Everybody from Ed Cole through Bill Mitchell to John Gordon is perfectly happy with the car and its sales performance, with the result that the 1962 model is practically unchanged. There are new hubcaps, new front, rear and side trim, and handsome new interiors—the Monza's can be seen on these pages. Otherwise it's as in 1961, but with some important new options.

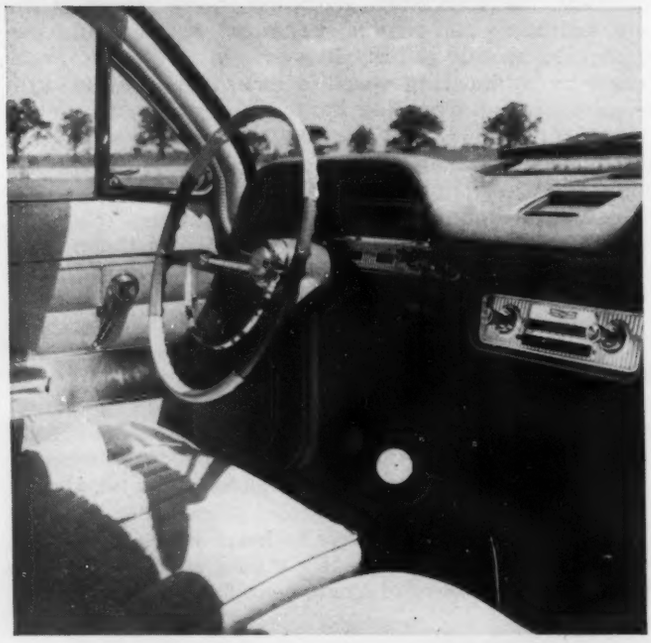
The Corvair has always sold to its own distinct market, and Chevrolet clearly intends that it should continue to do so. The task of combating the sales success of the Falcon has been delegated to the new Chevy II line, whose new engines are described beginning on page 28, so there's every reason to believe or at least to hope that the Corvair will be allowed to improve along the semi-sports lines it's followed so well already. Proof of this can be read in some of the entries in this list of Regular Production Options for the 1962 Corvair:

Powerglide transmission	RPO 360
Positraction (all ratios except 3.27 to 1)	RPO 480
High-performance engine	RPO 649
Four-speed transmission	RPO 651
3.89 to 1 ratio	RPO 662
Metallic brakes	RPO 686
3.55 to 1 ratio	RPO 693
Heavy-duty suspension	RPO 696

Some of the above are familiar; others will certainly be new to you. Positraction, for example, is available on the Corvair for the first time. The metallic brakes, an exciting addition, are the now-familiar sintered-iron type. We guess that since the Corvair and Chevy II share the same front spindles and brake assemblies (except for front shoe width), this kit is the same as that offered on the new Chevy for police use. The biggest news by far, though, for our readers, will be the heavy-duty suspension kit. We've driven a Corvair Monza coupe with this option and it makes a world of difference to the handling.

This special suspension is a direct descendant of that used on the Don Allen Corvairs that were raced at Daytona in February, 1960. A Driver's Report on one of these cars appeared in SCI of May, 1960. Main ingredient of the handling brew is stiffer springs all around. Front spring rates are up from 155 to 240 pounds per inch, and rear rates increase from 436 to 770 pounds per inch. The spring lengths are shorter, which reduces the car height by a bit less than one inch at the curb. This calls for different front end alignment and, more importantly, produces a slight rear-wheel

Local leadfoots will never know from the exterior of your 1962 Monza just what she'll do. A bit of twisty road will show them.



New interiors include different door and dash trim plus fewer seat pleats, and shift lever curved back nearer driver's hand.

1962 MONZA

It will take a sharp eye to spot next year's Monzas. Only minor external changes have been made. What's new is a list of exciting options that go further toward turning GM's baby into a real sports car.

negative camber at curb weight that increases as driver and passengers step aboard. The Delco shocks are recalibrated to work at higher pressures to control these stiffer springs.

At the front an anti-roll bar is added, mounted behind the suspension as it was on early prototype Corvairs, and at the back the suspension rebound straps are shortened to cut rebound movement to about 2½ inches, against the normal 4½ inches. This has much the same effect as a Camber Compensator, keeping the outside rear wheel from "tucking under" in a hard corner. No Corvair quick steering is available from the factory yet, since Chevrolet feels a new steering box is needed to do the job properly, and this isn't yet ready.

Through the kindness of Zora Duntov, developer of this option, we were able to drive a Monza so-equipped over 400 highway miles. We also tried it against a stock Monza on a small skid-pad on the G.M. proving grounds. Main conclusion: it does not significantly increase the car's sheer cornering power, but it makes it far easier to drive at the limit. The stock Monza sticks well right to the point of rear-end breakaway, which comes so suddenly that it's practically impossible to get the car back on its original line. It can be kept from spinning out, to be sure, but not from leaving its original path. In sharp contrast the Handling Monza reaches the same limit in a balanced, predictable manner, breaking away at the rear so smoothly and gently that it's a cinch to catch it with a flick of the light steering and proceed around the bend in a Porsche-like way. You can play around all you like at this limit with disarming ease.

Are there disadvantages? Darn few, in our opinion. The ride is definitely firmer, perhaps harsher over ripples, but in compensation there's much less pitch over bigger bumps. It has a sturdy four-square feel on the road. We won't say it makes the Monza a sports car, since more power is needed to accomplish that (see the next two pages). We will say the suspension option makes the Corvair Monza by far the most enjoyable American car to handle. Unfortunately we can't quote a price for RPO 696 at this writing, but be assured that whatever it costs, it's worth it.

Zora Duntov's Monza was also equipped with a non-available but highly interesting rear end ratio of 3.08 to one. Higher than anything now offered, it makes useful cogs out of low and second speeds and produces a Porsche-like overdrive top gear. We hope this ratio can be cataloged; it would aid both performance and highway gas mileage. —*C/D*

Heavy-duty suspension kit—new for '62—gives this Monza a nice flat-footed stance on GM's test banking. Option includes stiffer springs front and rear, revalved shocks, an anti-roll bar for the front end, and shortened rear rebound straps.

MODIFIED MONZA

by WAYNE THOMS

Corvairs may all look as alike as peas in a pod but you can make yours one in a million by building in or bolting on just the amount of horsepower and torque you need. The result is a low-cost tailor-made vehicle that's fun to drive.

Impressive performance on the drag strip hasn't detracted from the car's road manners. High cross-country averages are possible.

• A few months ago, on a lightly traveled road near Los Angeles, two Corvairs pulled up simultaneously and coincidentally side by side at a stop sign. Both were coupes, stock in appearance and sound. Suddenly both engines revved and they were off on an impromptu drag race. It lasted hardly long enough for a highway patrolman to say "illegal speed contest"; one car pulled away immediately, widening the gap and disappearing. The losing driver never did find out that his pride and joy had been beaten by a Corvair that had been taught to breathe, including among other things two extra carburetors, a point more compression ratio and some valve lightening.

The man responsible for this and similar quick Corvairs is Bill Thomas, of Pasadena, California. His modifications can be divided into several categories—from the mild to the wild. The primary concern was for the Corvair's basic weakness—breathing. We were able to try out some of the relatively mild changes applied to one of his own cars, a 1960 coupe with a three-speed shift and 3.89 to one axle. As he bought it new it had the 140 cubic inch engine with the 1960 95-bhp high-performance option. Although it's slightly handicapped with the three-speed the car has yet to be beaten by any other Corvair, blown or otherwise modified, during several excursions on organized drag strips. In the quarter mile, for example, it turned 86.88 mph in 16.01 seconds at the Fontana, California, strip using a straight-through exhaust system.

The proof of any modification lies not only in the stop watch but how strong the car feels to the driver. Anyone familiar with Corvairs is aware that a stocker is reluctant to leave first-gear rubber. Here the Thomas car proved its first point—long streaks of black on demand in low gear. Of more practical value, the car jumps out on long grades from 60, accelerating in a most unCorvair-like manner. It was impossible to run any timed top speeds but on a couple of occasions the near-accurate speedo ran off the marks into what may be presumed to be about 110 mph. Thomas estimates a top end of 120 providing 3.27 gears are used. The test car had a set of solid lifters and aluminum pushrods with which Thomas is experimenting. While we were turning the engine upwards of 6000 without valve float, Thomas maintains that it is possible to do the same thing with hydraulic lifters.

Evidence of satisfactory low end power was demonstrated by idling down to 20 mph (just over 1000 rpm) and flooring the accelerator. All four carbs opened full—and the car pulled smoothly, no bucking or faltering.

It's possible for anyone to duplicate or, as we will explain, surpass what Thomas has done to his Corvair. Should performance demands not be as rigorous there are lesser stages available.

Let's start with what is essentially Stage One, the four-carburetor kit. This may be installed in about four hours without removing the engine. It sells for $50 and includes adaptor plates, new linkage, studs, fuel lines and a fuel block. The customer supplies two more stock carbs, jets all four generally leaner, and immediately has a Corvair that starts and idles easier because of better fuel distribution. There are no flat spots, in fact no objections anywhere through the rev range. This single change accounts for about three mph and a one-half-second improvement over stock in the quarter mile. From a seat-of-the-pants viewpoint, the car feels and is stronger in the 50-80 mph passing range. Because the carbs are turned 90 degrees, the floats are no longer outboard and the unpleasant situation of fuel slosh and power loss in hard turns has apparently been remedied.

Installation is a matter of cutting two holes in the intake manifold (a template is supplied with the kit), carefully removing the metal chips with a vacuum cleaner and bolting on the parts.

From here on the changes are internal, performed as a machine work service by Thomas. He says that he will supply the carb kit and do the porting and milling as done on his car and described here for $150. This would be on an exchange or rework-the-customer's head basis. So that a customer's engine need not be torn down for a considerable period, he will ship parts, charging a deposit that is refunded when the cus-

tomer's stock heads are returned. Inquiries may be sent to Bill Thomas, Box 4127, Catalina Station, Pasadena, California.

Compression has been raised from 8 to 9 to one and can be taken to 10.5. This is an especially delicate operation that involves milling off the head register surfaces. In this case, .062-inch gives 9 to one. Each register surface must be the same height or a cylinder barrel will leak. Finally, the lower head plane must be milled the same amount as the register surface to prevent barrel interference.

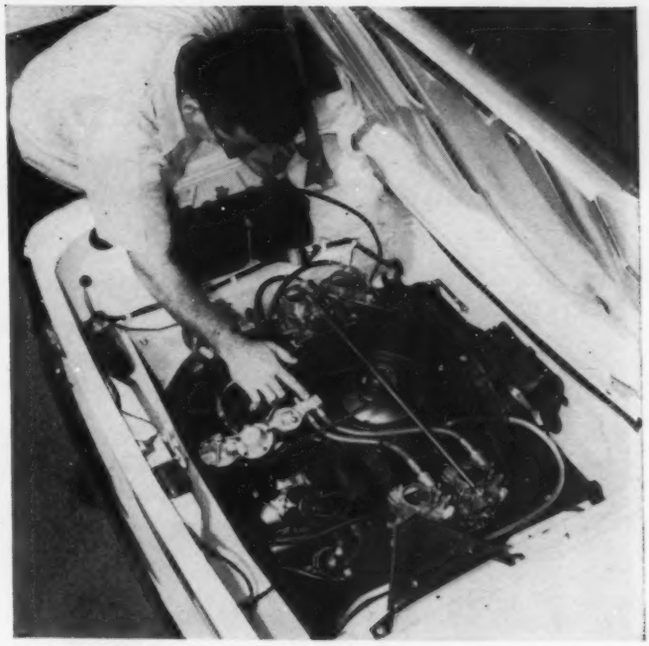
If anything in the engine could be classed as a speed secret it would have to be the port work. As supplied by the factory, Corvair heads do not breathe very well. Anyone can remove metal but Thomas proved that it must be done correctly to gain performance. He cuts into the ports with a duplicating machine so that all work is accurate. The boss around the valve guide is removed and material is taken away well into the intake and exhaust ports. He opens up the area adjacent to both valves to create what he terms a "funnel effect." The valves themselves come in for machine work under the head which lightens and leaves them less restrictive.

What does all this accomplish? His car indicates 102 horsepower at the rear wheels at about 5000 rpm on the chassis dyno. Consider that a stock 98-bhp Monza does well to show 71 bhp at the wheels and the true road horsepower gain becomes apparent.

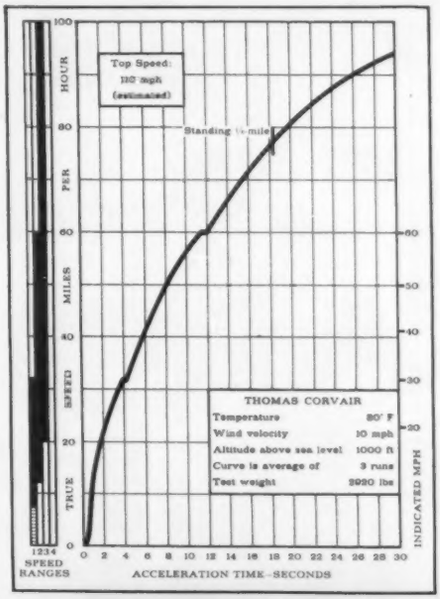
Thomas recommends some timing changes for best acceleration. He limits the advance curve to about 10 degrees in the distributor, using a high initial advance so that full advance, totaling 36 degrees, is reached at 3000 engine rpm.

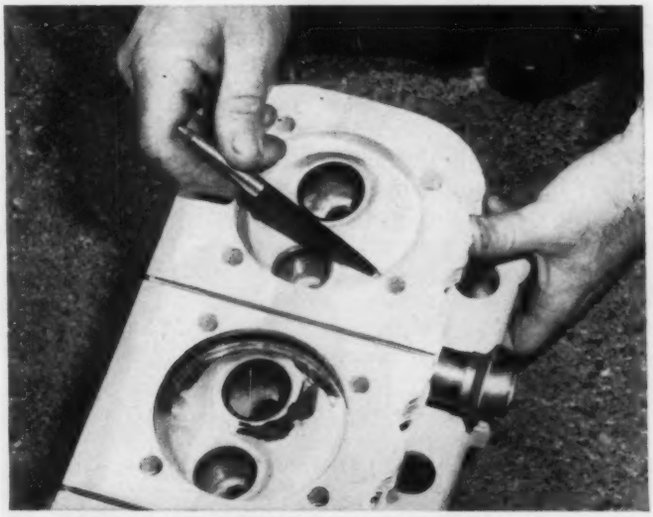
Exceeding the performance we experienced is more expensive but Thomas will do it or sell plans and instructions for $5 that any good machinist can follow. Briefly, he raises compression, machines combustion chambers, cleans up ports, uses considerably larger valves at a new angle, Corvette valve springs, new shoulder-type valve guides, new valve seats, higher rocker arm ratio for increased valve lift, and a completely new exhaust manifold with larger port sleeves exiting the engine at a new angle. At this point we are beginning to talk in the $300 range, also in the over 160 bhp engine class.

The methods of hopping up a Corvair vary widely and Thomas has certainly not chosen the easiest. Nevertheless his techniques work exceedingly well. —*WT*

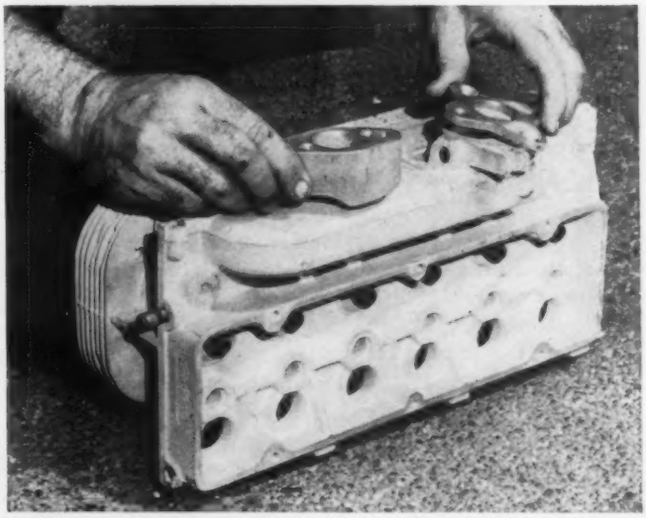


The fuel block assures even distribution to the four stock carbs. Mounting their float bowls inboard eliminates flooding problems.





For even more power than the four carbs provide, the compression ratio can be increased by milling the register surfaces.



New parts for each cylinder bank include pylon for additional carb and adapter to rotate the original carburetor 90 degrees.

SPORT OR SPECTATOR . . .

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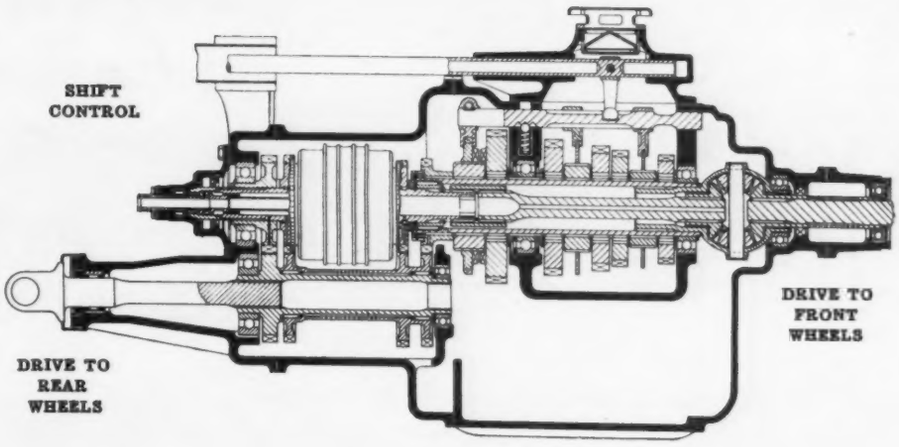
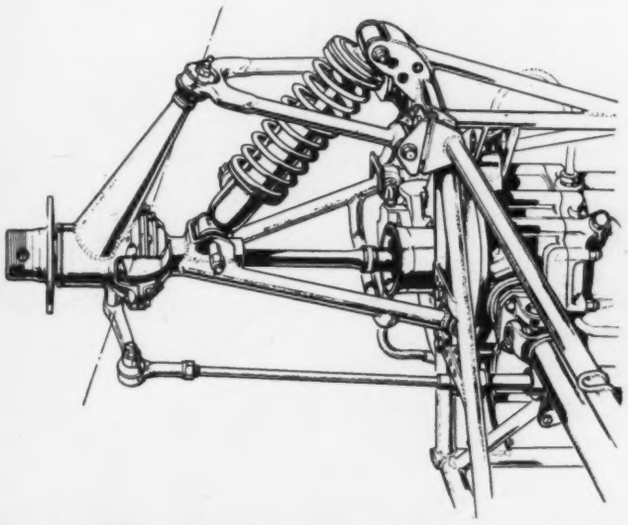
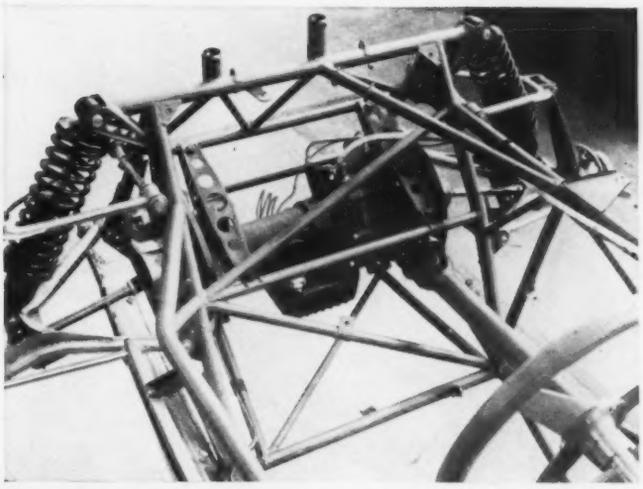
Ferguson P99

Drawing of the Ferguson transmission unit illustrates the 5-speed gearbox, the 3rd differential and the duplex clutch control unit. The differential which allows speed variations between front and rear wheels, within distinct limits, is located ahead of the gearbox, and one output shaft drives the front differential while the other drives the rear through the gearbox. All 5 speeds are indirect, selection of the straight-cut gears being effected by staggered dogs. 11 different ratios are available for the primary reduction (not shown) located at the input end of the gearbox.

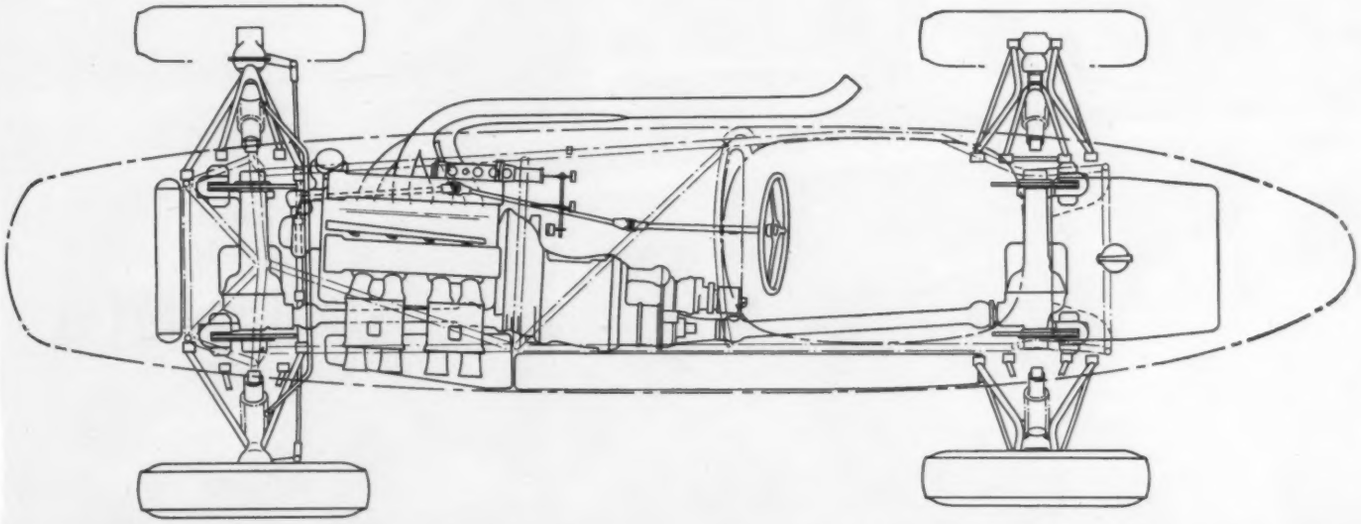




The layout of the Ferguson front suspension in its racing form is much more sophisticated than the original version patented in 1951, where entire swinging half-axles were turned for steering. Project 99 uses unequal-length wishbones, the wheels pivoting on ball joints, the lower of which are located at hub level and constitute a housing for the Rzeppa joints. The coil springs enclose telescopic shock absorbers in normal fashion.

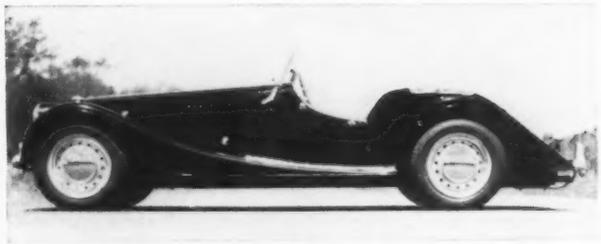


The rear end utilizes suspension units identical with those at the front—a principle retained from the 1951 prototype. The oil sump with cooling fins is visible, and it is noteworthy that the housing does in fact possess its own oil pump. The oil is channeled to the engagement point of the straight-cut pinion and ring gear and returns by gravity to the sump. The instruments include both oil temperature and oil pressure gauges.



The unorthodox layout and compact dimensions of the Ferguson are evident from this plan view. The Coventry Climax engine is tilted at 17° to the right and also canted at 3° to the longitudinal center line of the car. The driver's seat is slightly offset to the right to go clear of the rear propeller shaft. Wheelbase is 90 inches and the manufacturer claims a starting line weight of 1456 pounds. Front/rear weight distribution is 51/49 and the turning circle is 37 feet between curbs.

Road Research Report: Morgan 4/4 Series III



• The Morgan Motor Company observed its 50th anniversary in 1960 and celebrated the event by introducing the 4/4 Series III. The least expensive Mog, it uses English Ford's 105E overhead-valve engine and four-speed transmission.

Viewed dispassionately, the Series III is notable for its decidedly dated styling, its uncompromisingly harsh ride and passenger accommodations that are practically medieval. However even a ride around the block should be enough to convince you that the neo-classic Morgan cannot be viewed solely as an object on four wheels. Its styling has a fierce practicality, reflecting the basic soundness of its engineering, and possesses no small amount of flair. The ride must be analyzed in terms of what it does for the driver, giving illusion-free information about what the car is doing in relation to the road at all times. As for the passenger accommodations, well, who ever decided sports cars should ride like baby buggies and be equipped with power tops and wind-up windows anyhow?

Our Road Research Report extended more than 1100 miles, including driving at both Thompson Raceway and Lime Rock Park. The car broke in without fuss (other than some boiling over which we will discuss later), used no oil and proved to have good fuel economy.

The performance of the Series III is better than the Series II which it replaces, although the latter in its hopped-up form (see SCI, November, 1957) will outdrag the new car. The Series II was powered by the old flat-head Ford engine and used a three-speed transmission. While the Series III will provide good all-around performance, one consideration in our deciding to test it was to find out what kind of basis it might be for using some of the speed equipment available for the 105E mill. After discussing the features and faults of the standard 4/4 we'll give you a run-down on the bolt-on, bore-out, boost-up bit. The other reason for our wanting to test the Series III was to get reacquainted with the classic sports car.

There are only a few external differences between the Series II and the Series III. The new car uses different taillights (like those on the MGA 1500) and the side curtain fasteners are on the outside of the door. This latter change eliminates the annoyance of snagging a sleeve on the hardware during violent cockpit maneuvers.

VIRTUALLY HAND-BUILT

The overall appearance is enhanced by a smooth blending of straight and curved lines. The hand-made radiator grille (Morgan employs 68 persons directly concerned with turning out the virtually hand-built cars) flows into a long hood that probably fools some bystanders into thinking it's covering a straight-eight. The car gives the impression of being quite long although its actual exterior dimensions are tidy. The rake of the front fenders and the sweep of the flattened tail section add to the illusion. The single Lucas driving light mounted low-down for best illumination in fog helps too and supplements the no-nonsense air of the car. There are no frills. The standard Dunlop disc wheels are perforated to help brake cooling and the hub caps are smooth chrome-plated discs. There's no need for bold script to tell the world it's a Morgan (that fact is noted only by the Morgan emblem on the grille surround); anyone who knows anything about sports cars recognizes the *marque* at a glance. The externally mounted spare and the louvers on the side of the hood are in keeping with the functionalism of the whole car. To some it may look "old fashioned" but to sports car buffs, the people who buy them as fast as they're built, Morgans are as up to date as tomorrow's headlines.

After picking up the Mog at Fergus (pausing momentarily to admire some of the TR-3-engined Plus Fours) we put a few miles on it before heading for Thompson Raceway. We made the trip in a steady downpour and, to put it mildly, driving over 200 miles under such conditions put the car in a very unfavorable light. Despite the snug appearance of the top, rain poured in over the windshield, around the edges of the side curtains and dripped steadily on the drivers right ankle from under the cowl. Being a true enthusiast's car, it had no heater or defroster. If you want ventilation you're supposed to leave the top at home since there are no vents and the flaps in the side curtains won't stay up by themselves. Under such conditions we weren't disposed to witty banter so we occupied ourselves with bailing out the cockpit and keeping the windshield reasonably unfogged.

If the Mog had a top arrangement like that on the Sprite, leaks at the leading edge would probably be minimized. Since it doesn't an owner could cement some rubber weatherstripping to reduce the waterfall effect.

HANDLES LIKE A WINNER

Once at the track we abandoned the top altogether to take some laps. Despite the persistent rain and the squishing every time we moved in the seats the 4/4 proved a real ball to drive. The handling of the car is one of its strongest virtues and skids could be provoked only with deliberate wheel movements. The billiard-table-flatness and the light, quick steering kept things in hand at all times. The Dunlop Gold Seal tires gave a good bite with predictable breakaway and good recovery characteristics. The car had a sure-footed feel in spite of track conditions although on the open road when the surface got very rough it tended to skate, with control diminishing in direct proportion to the frequency and intensity of the bumps. The effect of tire pressures on road behavior may be clearly demonstrated in the Mog. If they are too high the ride will rattle the fillings from your teeth while those that are too low will make the car behave like a greased snake on a hockey rink. For best results (a reasonable compromise of ride comfort and control) use the recommended figures or 2 or 3 psi more.

The car seemed badly geared for the Thompson circuit with second gear the key offender. Overrevving in second or lugging in third were the only alternatives in some corners and lap times suffered as a result. It was impossible, furthermore, to peak out in fourth and third was too low for the length of the straights.

At Lime Rock things were better. For one thing the sun was shining. In addition the corners didn't require using second gear, third providing enough dig through the tighter sections. However it still wasn't possible to wind it out all the way in fourth. Comparing the two sessions, Lime Rock brought home the need for more power while gearing played the dominant role in the Thompson turnings.

The Ford four-banger with its single-throat Solex carburetor had excellent responsiveness, with no slack or binding spots noticeable in the cable linkage. Tromping on the loud pedal (and it was just that with the straight-through "silencer" mounted on the car) caused a pleasant "wonk" sound as air rushed into the carb. The air cleaner, if you care to call it that, resembles a small sheetmetal roof. Stuck on top of the carb, with no filter element, it's enough to prevent a mechanic's false teeth from falling in but that's about all.

The engine started with a twist of the key even after standing in heavy rain. It idled smoothly with a pleasant mechanical whirr and seemed free from vibration in all ranges. In its standard form, it develops 39 bhp at 5000 rpm, compared to 36 bhp at 4500 rpm in the former model.

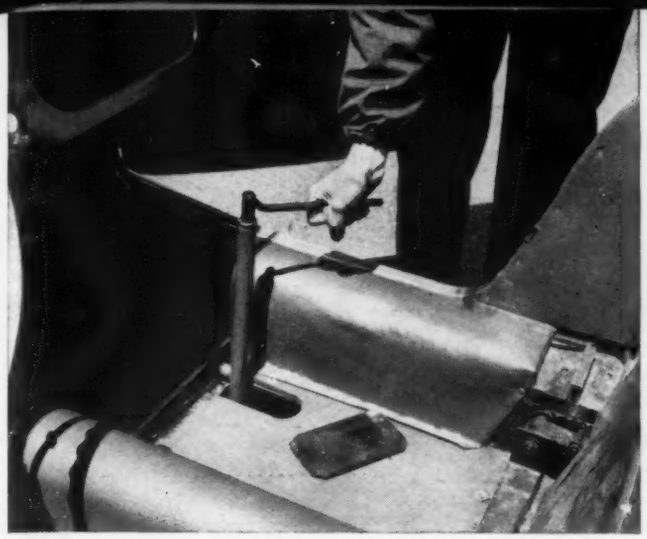
Our only real complaint concerning the engine was its tendency to overheat in traffic. With only a two-bladed fan, air flow at low speeds is restricted and the car lacks the louvers on top of the hood that other Morgans had. However, by the time you read this a four-bladed fan will be standard equipment. The lack of a water temperature gauge complicates the overheating question; not even a warning light is fitted. A gauge could be installed without much work and we'd recommend it.

Even with the hardest running, the lowest gas mileage figure we recorded was 25.8 mpg. This was when the engine had only about 350 miles on it and had been driven mostly in traffic. We reached a high of 29.7 mpg cruising at 60 to 65 mph. There was every reason to believe the figure would improve as the engine continued to limber up. Regular fuel was all that was needed; there was no trace of pinging or running-on and (seemingly) any old volatile substance would work fine, although Morgan recommends using premium.

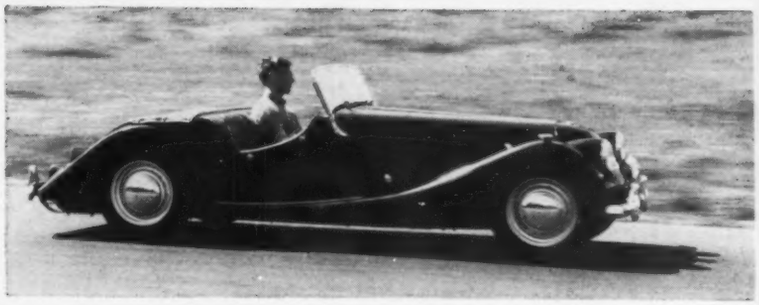
The new engine slips neatly into the underslung Morgan chassis with its unique Z-section side members and vertical coil spring independent front suspension. Consequently Series II owners shouldn't have much trouble installing one of the new units together with the four-speed box if they should want to. The transmission is a little wider than the three-cog box and the frame has been modified slightly to accommodate it. At the same time interior foot room has been increased by widening the internal cowl/firewall section, but without widening the actual hood width. The engine is mounted at three points. Two of them are on the sides of the block with the third under the transmission. The clutch and bell housing are wholly within the engine compartment.

UNUSUAL SHIFTING ARRANGEMENT

To avoid the awkwardly long shift lever which would be necessary if a direct-acting prong were used, a simple remote control is adopted. The shift pattern, consequently, is a little weird as the lever projects almost horizontally from the firewall. A short vertical shaft projecting from the transmission is rigged to a suitable joint on the horizontal lever. The latter, in turn, is mounted at its forward end in a tube which is mounted in rubber to permit fore-and-aft and side-to-side movement. The shifting motion is like thrusting with a fencing foil. To shift from neutral to first, the shift knob is lifted slightly and jabbed forward in one motion. From first to second the action is like pulling a broom stick downstairs. It's not as screwy as it sounds. Shifting can be done rapidly and accurately; the required motions are quite small and there is a crisp feel to the gate. While we wouldn't give the arrangement an unqualified endorsement, it's effective, easy to learn and it adds to the "far out" quality of the whole car. The car accelerates in a businesslike manner, a sharp brrap issuing from the tailpipe, up to about 65 mph. Over that speed additional notches on (*Continued on page 83*)

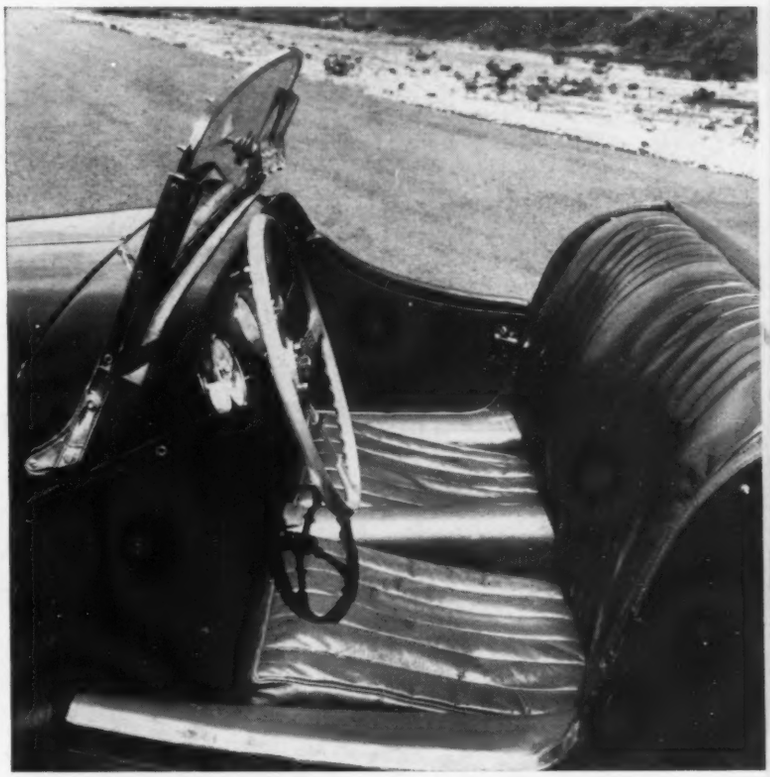


The 4/4's jacking system requires that the occupant get out, remove the seat and support, then slip the unit into the frame.

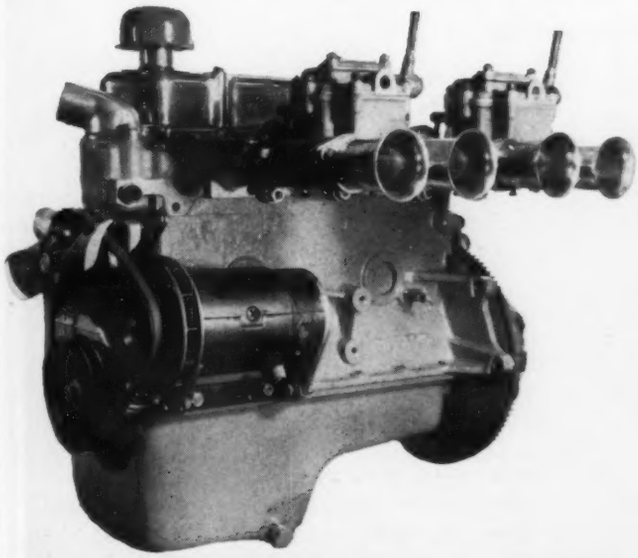


There's only one word for the Mog: rakish. Its sweeping fenders and long flat hood go well with its classic handling and ride.

Morgan fans mourned the passing of the flat radiator grille and short front fenders, but the modernized front end is attractive.

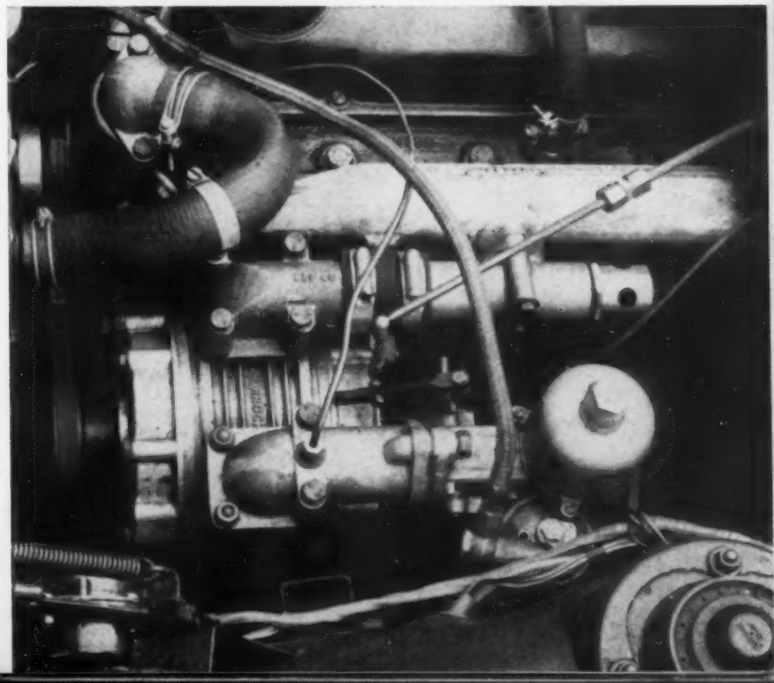


Rich leather hides the wood floorboards and gives the Morgan a quality feel. The suction rear view mirror is a Mog institution.



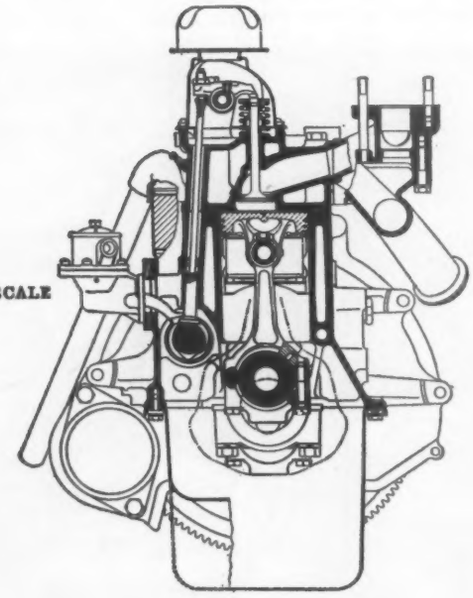
Representative of the hot 105E engines is this by Lawrencetune with twin-throat Webers, increased compression and new cam.

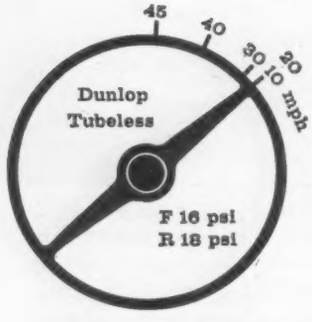
As mentioned in the text, the Shorrock supercharger is an easy step for increased power. Here's one on a stock Anglia engine.



Road Research Report: MORGAN 4/4 SERIES III

Importer:	Fergus Imported Cars, Inc. 1717 Broadway New York 19, New York
	Worldwide Automotive Imports, Inc. South Sepulveda Boulevard West Los Angeles, California
Number of U.S. Dealers:	50
Planned annual production:	250
Dollar value of spare parts in U.S.:	$40,000 + EnFo dealers





Steering Behavior

Wheel position to maintain 400-foot circle at speeds indicated.

Engine Flexibility
RPM in thousands

PRICES

Basic Price	$2340
Options fitted on test car	None
Total price of car as tested	$2340
Options available:	
Heater & Defroster	65
Special color paint	50
Tonneau cover	45
Second driving or fog light	20
Luggage rack	57
Disc brakes on front wheels	80
Competition kit, including aluminum cylinder head, intake and exhaust manifolds, two SU carburetors, heavy duty valve springs and tachometer	200
Hood strap	12
Heavy duty front suspension	35

OPERATING SCHEDULE:

Fuel recommended	Regular
Mileage	25-31 mpg
Range on 9.5 gallon tank	235-295 miles
Oil recommended	SAE 10W/30
Crankcase capacity	3 quarts (4 with oil change)
Change at intervals of	2000 miles
Number of grease fittings	11
Lubrication interval	2000 miles (see text)
Most frequent maintenance:	Oil sliding axles (200 miles)

ENGINE: (Ford 105E)

Displacement	60.8 cu in, 997 cc
Dimensions	Four cyl, 3.19 in x 1.91 in
Valve gear	Pushrods, vertical overhead valves in line
Compression ratio	8.9 to one
Power (SAE)	41 @ 6000 rpm
Torque	53 lb-ft @ 2700 rpm
Usable range of engine speeds	1000-5300 rpm
Correct piston speed at 5000 rpm	2055 fpm

CHASSIS:

Wheelbase	96.0 in
Tread	47.0 in
Length	145.0 in
Ground clearance	7.0 in
Suspension: F, ind., coil spring, sliding pillar; R, rigid axle, semi-elliptic springs.	
Turns, lock to lock	2.7
Turning circle diameter between curbs	L 38 ft, R 34 ft
Tire and rim size	5.20 x 15, 4J x 15
Pressures recommended	16 F, 18R
Brakes: type, swept area	7 in drum; 141 sq in
Curb weight (full tank)	1570 lbs
Percentage on driving wheels	55

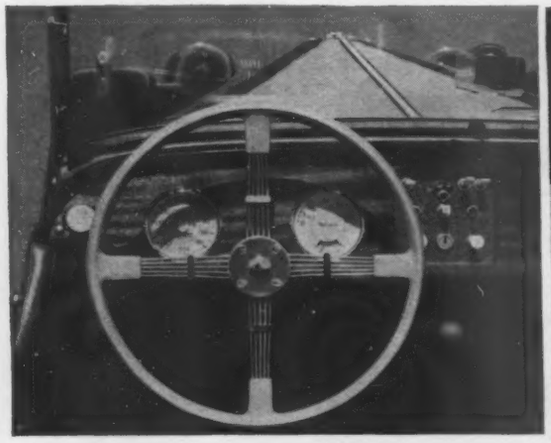
DRIVE TRAIN:

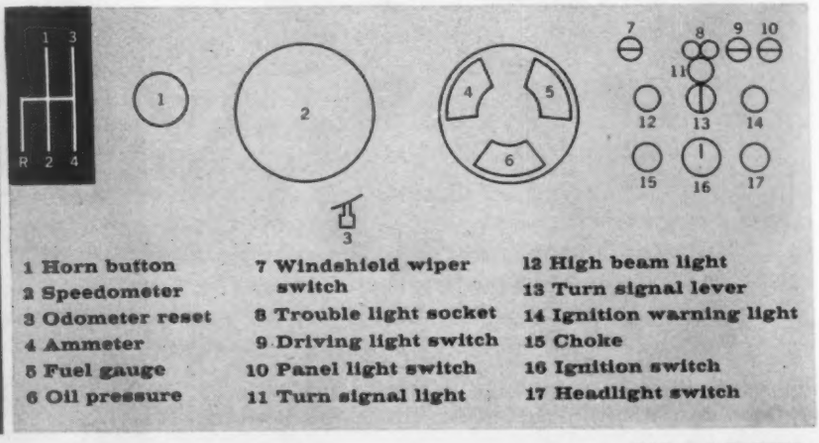
Gear	Synchro?	Ratio	Step	Overall	Mph per 1000 rpm
Rev	No	5.40		23.70	—3.2
1st	No	4.11	72%	18.10	4.1
2nd	Yes	2.40	70%	10.54	7.1
3rd	Yes	1.41	41%	6.21	12.1
4th	Yes	1.00		4.40	17.1

Final drive ratio: 4.40 to one; no options at present.

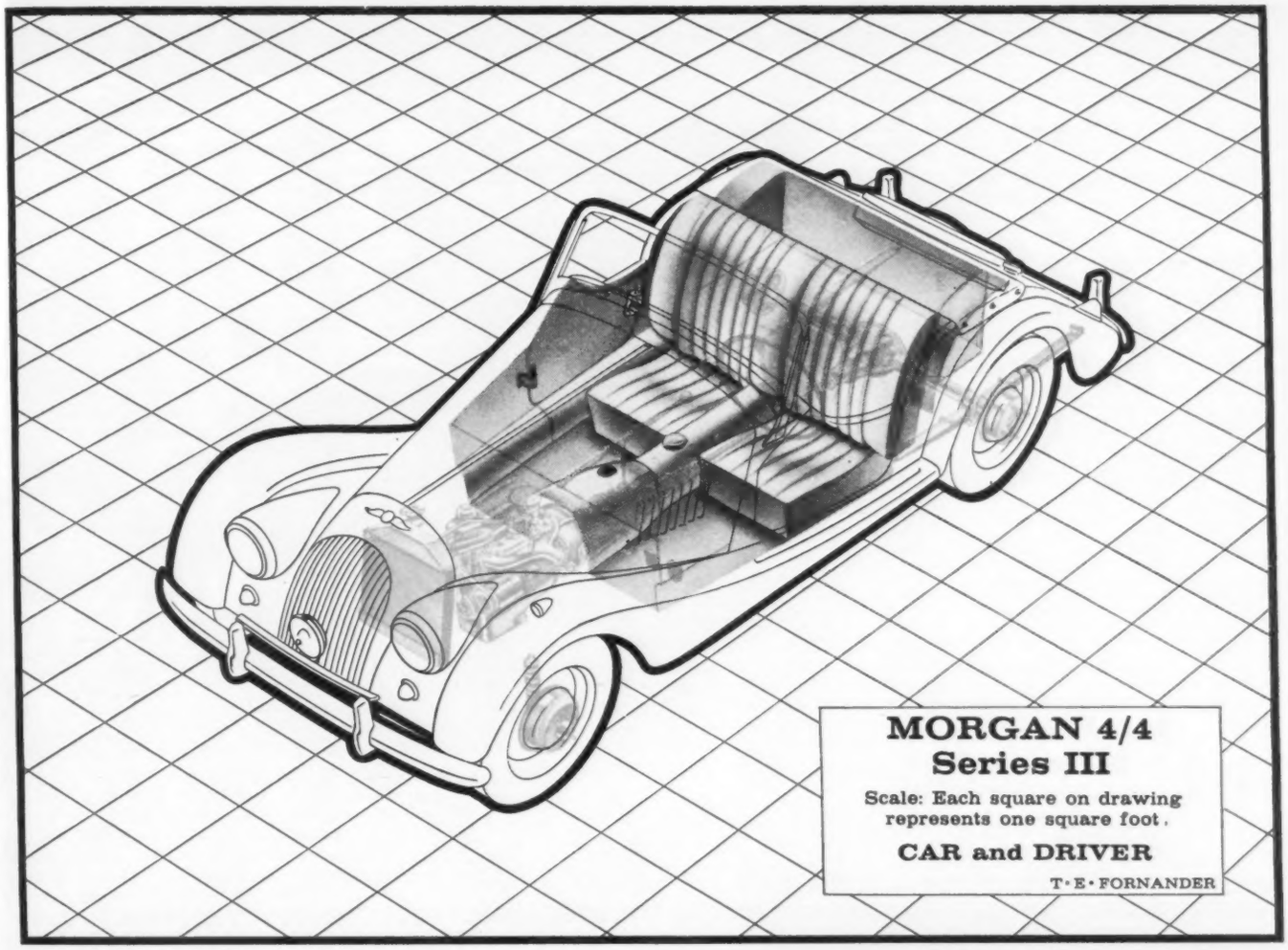
ACCELERATION:

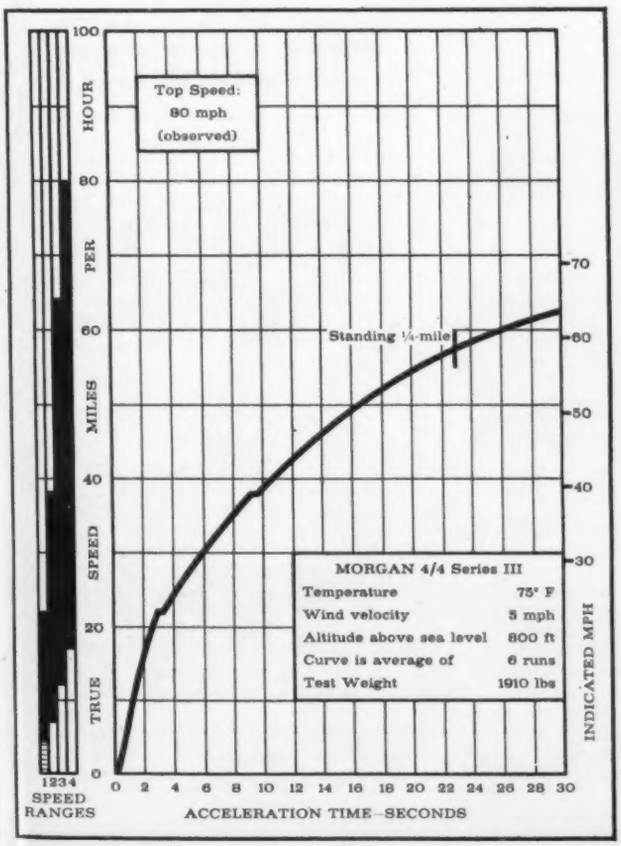
Zero to	Seconds
30 mph	5.9
40 mph	10.7
50 mph	16.6
60 mph	25.8
Standing ¼ mile	23.0

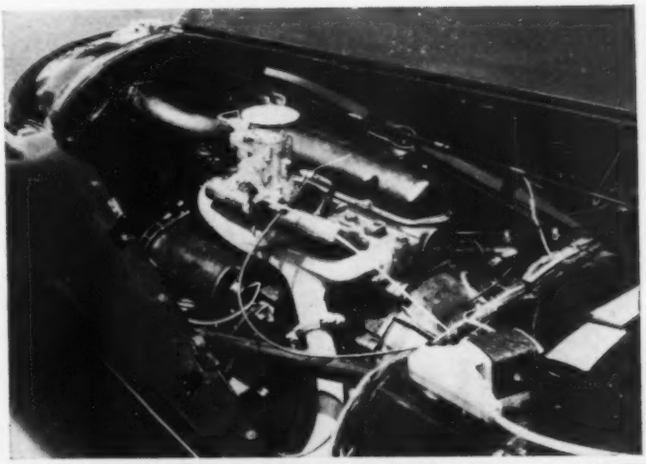


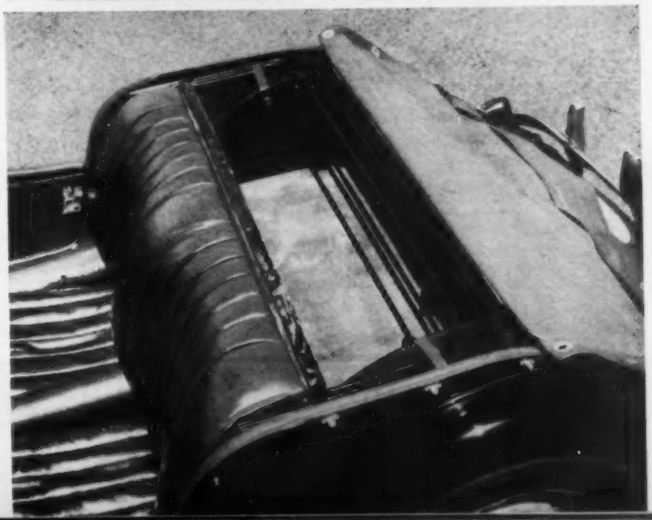


1 Horn button
2 Speedometer
3 Odometer reset
4 Ammeter
5 Fuel gauge
6 Oil pressure
7 Windshield wiper switch
8 Trouble light socket
9 Driving light switch
10 Panel light switch
11 Turn signal light
12 High beam light
13 Turn signal lever
14 Ignition warning light
15 Choke
16 Ignition switch
17 Headlight switch


MORGAN 4/4
Series III
Scale: Each square on drawing represents one square foot.
CAR and DRIVER
T·E·FORNANDER


Top Speed:
80 mph
(observed)
Standing ¼-mile
MORGAN 4/4 Series III
Temperature 75° F
Wind velocity 5 mph
Altitude above sea level 800 ft
Curve is average of 6 runs
Test Weight 1910 lbs
TRUE SPEED MILES PER HOUR
INDICATED MPH
1234 SPEED RANGES
ACCELERATION TIME—SECONDS





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366!

Continued from page 20

however 366 cubic inches is an awful lot of power to put into a light chassis such as you have proposed. If you are going to try to get a lot of these cars going there will be some relatively inexperienced people driving them, which I think would be the next thing to suicide." As we conceive it, 366 is essentially a professional proposition. It will, incidentally, be much more feasible to implement in view of the recent SCCA policy liberalization regarding racing for pay. As a result, the driving standard may be expected to be very high. It will not be a "training ground" Formula and novices may be expected to be discouraged by regulations, the admittedly high performance of the machines and by the expense likely to be incurred in building a top-rate Formula 366 car. Furthermore, for those who are likely to be driving the cars it can be said that power in a racing car is an asset to control rather than a danger factor. Karl Ludvigsen's observations on the "Formula 366 Scarab" would appear to bear this out. See page 21 for his reactions to the 165 mph adventure.

Dick Troutman called the Formula "extremely exciting" and said it had "tremendous possibilities." He said Troutman-Barnes would like to build a car for Formula 366 and asked for racing dates. We agree with him when he says, "a car like this with no place to race is as bad as owning an obsolete race car." We are happy that organizers have expressed an interest in the Formula. CAR AND DRIVER magazine pledges to back it to the hilt, continuing negotiations with track owners, promoters, car owners and drivers to get Formula 366 into effect as soon as possible to the benefit of road racing in general and the spectating American public in particular.

International acceptance of the Formula is almost inherent in its specifications because of its road racing basis. It could be adopted as a redefinition of the Intercontinental Formula as Cam Argetsinger and Tom Binford suggested, but for North American events in the immediate future, there is no pressing need for FIA approval. Formula 366 fits the current needs of this continent just as Formula Junior was tailored to Italian racing needs in its beginning before it received CSI sanction.

We can already announce that one promoter (name on request) is seriously considering an event for 366, and that its merits are being weighed by several sanctioning groups. The Indianapolis Speedway management is now contemplating a three-liter engine limit to be effective in 1964. If this were brought about—a fine idea—Leo Goossen with Meyer-Drake would certainly build a new 180-inch engine, and in today's racing climate this would surely be laid out to be as useful in road racing as in track competition. Hence we'd have a new native racing engine for Formula 366!

Single-seater Formula racing has arrived at last in America; 366 could be its most exciting form. The need is great and the potential is fantastic. —*HW*

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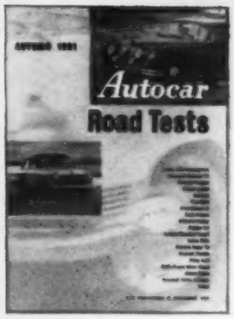
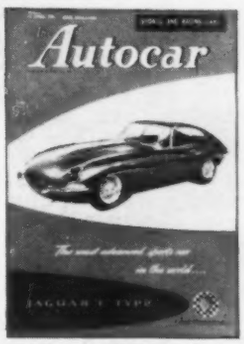


THE AUTOCAR ROAD TESTS, AUTUMN 1961

Each road test comprises a full four-page, detailed analysis of the car's performance in the hands of an expert critic. Clear illustrations and tabulated performance data are given of each car.

Among cars planned for inclusion are

Jaguar E-type
Chevrolet Corvair
Lancia Appia 3
Ford Thunderbird
Citroen Bijou
Standard Vanguard 6
Warwick G.P.
Singer Gazelle 36
Volkswagen Karmann Ghia
Triumph Herald 1200
Rambler Estate Car
A.C. Greyhound
Fairthorpe Zeta
Daimler Majestic Major
Buick Special
Ford Taunus 17M
Cadillac 75 Fleetwood
Mercedes 190
Austin Healey Sprite
Dodge Dart
Simca Montlhery



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Pick of the Tops: Sparkling photo-feature giving 7 pages of pictures of the world's top performance cars for fast road work, rallies, or a combination of these with domestic motoring . . . from Britain's Alvis TD21 to America's Chevrolet Corvette.
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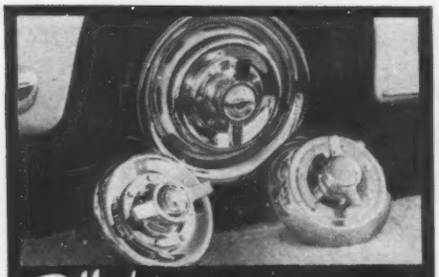

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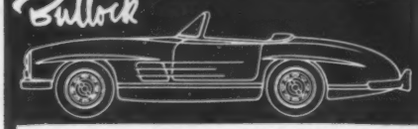

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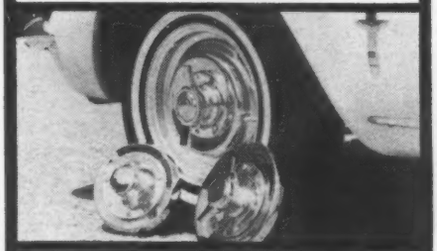

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D. B.

Continued from page 37

David Brown became managing director the average yearly turnover was around the $2 million scale; now it is $60 million.

This was the pattern of genius which touched the Aston Martin concern as it came to the end of a slow, downhill ride in 1947. The fortunes of thoroughbred sports cars have nearly always teetered on an economical razoredge. Somehow the genius for designing and building great cars is rarely combined with the financial talent to make them pay. A.M. had a proud history of car building and a sad chronicle of financial crisis. Successive engineers of vision and talent, beginning with Lionel Martin back in 1914, through A. C. Bertelli, W. S. Renwick and Claude Hill had been supported by enthusiastic backers like Count Zborowski, Lady Charnwood, her son the Hon. John Benson, L. P. Brune, and R. Gordon Sutherland. Each of the various combinations in turn came to a financial deadlock, years of crisis being 1923, '26 (in liquidation), '33, '38 and '47. In those years many classic cars were built, notably the famous "Bunny", and the outstanding "Ulster" and Mark II models of '34-'36 (SCI, March 1957, July 1959).

The "rare combination" theme of design ability and financial talent begins with the D. B. era. At the time Brown took over the firm, R. G. Sutherland and Claude Hill were nursing an advanced two-liter design on very thin financial ice. By the end of '47 full-blown development was in progress and limited production beginning. With his usual flair Brown had called on the services of St. John "Jock" Horsfall as test driver. Horsfall, with much prewar experience, was a natural for the job. By early '48 the car was well ahead of schedule. Brown entered it for the Spa 24-Hour race, so just over 20 years after his premature "retiral", he was back at the race course. Horsfall and Leslie Johnson drove the car to victory. Within eighteen months of taking over, David Brown had produced a major race winner. The moves that followed were typical of Brown's single-minded pursuit of an idea.

In 1947, in addition to taking over Aston Martin, David Brown had bought the famous Lagonda company. One of the more valuable assets in that deal was the two-o.h.c. six-cylinder engine designed by W. O. Bentley, who had cut his connections with the Rolls-Royce-absorbed Bentley *marque*. After studying the potential of the two-liter pushrod engine in the Spa winner, Brown saw clearly that this Lagonda engine was the next logical step. In 1949 he announced the Aston Martin entry for Le Mans and followed this with the big decision to use the 2.6-liter twin-cam engine in at least one car. This was a significant step, and the beginning of a policy which led through many roads—some rough, some smooth—to the DBR1/300, the 1959 Le Mans victory and the Sports Car Championship.

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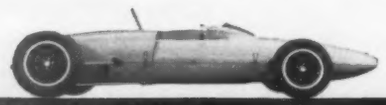

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During those ten years, an observer around the pits at most of the international sports car meetings would have noted a dapper silver-haired man with keen, smiling eyes behind glasses, watching the Aston Martin affairs with close attention. Alert, yet relaxed in attitude, David Brown maintained close personal contact with all the team's activities. During practice periods he followed his cars' performance with critical precision. Many of them, in fact, he had already road-tested, for Brown assesses his cars, in the old time-honored habit of his engineering training, by practical operation. All the make's prototypes have passed through the "Patron's" hands at all stages in their development. Many of the most potent have been retained for a while as personal transport, notably a hard-top version of the DB3S which was about the quickest way possible, at the time, of getting from A to B—without leaving the ground.

When David Brown does leave the ground he still stays at the controls, in this case of the twin-engined Dove company plane, for flying is another of the many abilities in the Brown repertoire. His interests are widespread; he is an active farmer with a professional interest in his farm's mechanization, and a personal interest in thoroughbred horse-breeding. He is a keen horseman and a regular rider at fox-hunting meetings. But all these activities are secondary to his car interests.

In answer to Britain's needs Brown committed all of the organization's resources to wartime production of gearboxes for tanks and gears for Spitfires. The firm's war contribution was immense. In the immediate postwar period there were fewer outlets for this high-quality machine production. Brown said of his entry to car production, "A large part of our gearing production goes to the automobile industry and Aston Martin and Lagonda would not only give us a further outlet but provide us with valuable knowledge in this field. Also I have always been interested in fast cars, and why shouldn't one do something one wants, once in a while?"

Of problems he had plenty: internal problems in getting his ideas into operation; bigger problems of beating the difficulties of supply of vital components in a very exclusive industry. The serious threat of going short of bodies—a ruinous possibility—was characteristically solved by buying the eminent body-building business of Tickfords of Newport Pagnell, a British equivalent of Bertone or Farina.

Whatever the success of succeeding A.M. cars, one thing is sure: David Brown has made a permanent place for himself in the motor and motor-sport history of our times. To Brown this will be a very accidental byproduct of his efforts. He is a quiet, publicity-shy individual who set out with a motoring ideal in mind, and met the ultimate in every motoring challenge to achieve it. With the introduction of the DB4 and the more recent G. T. model he modestly suggests that he is getting near to it. He has good support for this opinion from an august body of Aston Martin and Lagonda owners. It includes Prince Philip, King Baudouin of Belgium, Prince Bertil of Sweden, King Hussein of Jordan and many others who place their motoring trust in the initials D. B. —*HMcG*

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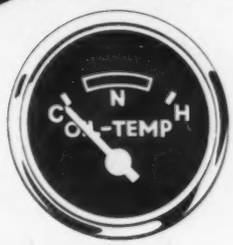

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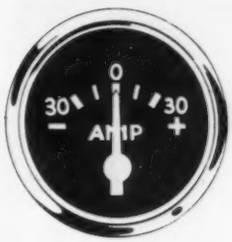

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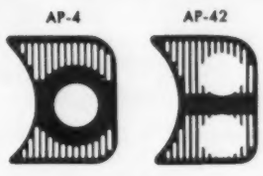

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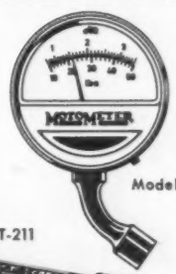

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Continued from page 40

ripped off him by the force of the contact. A suspected punctured lung and spleen as well as broken ribs do not augur well for his 1961 season.

Big Dan Gurney drove a good race at Aintree. Both Porsches were the same as at Reims, the four-cylinder models with old chassis as well. Bonnier's engine was apparently putting out more power than his teammate's. Dan made a good start and eventually found himself fighting with Bruce McLaren's Cooper-Climax. Both cars were equally matched but Dan got by Bruce by a comfortable margin, finishing seventh. Gurney's 1961 season has not been as successful as he had hoped and the Porsche "mentality" is not exactly to his taste; disappointment over the lateness of the Porsche eight has not helped matters. Dan is a fighter—a fast driver and a guy with more guts than a lot of his compatriots. He wishes fervently that an all-American team were participating in Formula 1 racing, regretting more than a little the absence of Lance Reventlow's organization. Both Gurney and Bonnier have done wonders with the outmoded four-cylinder Porsches; it's my opinion that Gurney is the faster of the two and anybody who saw him at Reims two weekends before would have to agree with me.

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It seems that by the Italian Grand Prix at Monza, Stirling Moss will have a Coventry Climax V8 at his disposal, an engine which by that time should be putting out 175 bhp. How much good this will do Stirling at that late date is of course the question. Nevertheless it is news that Climax will beat B.R.M. into the breach with a V8 powerplant to attack the Ferraris—and at least be able to stay with them. Unquestionably 1961 is a Ferrari year; the only question remaining is who will be champion, Hill or von Trips. On the basis of Trips's performances both at Zandvoort and Aintree, I have a strong feeling that the next World Champion will be German. Whether or not Phil Hill deserves the Championship is another question. Phil has shown his devotion, skill and courage on more than one occasion but I'm very much afraid that he will emerge as another tragic figure, as has Moss—the man who tried hardest, as hard as he knew how—but never quite made it. I fear the handwriting is on the wall. —*JLA*

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MORRIS-COOPER

Continued from page 55

all gaps slightly.

Searching experiments in the road-holding and handling fields led to the conclusion that no scope for improvement existed here, so they left well enough alone. But the tires, of four-ply nylon construction, were specially developed by Dunlop. They don't have any perceptible effect on the car's handling, their object being to cope with the extra heat generated at speeds way beyond the 850's reach.

Having previously sampled several varieties of extensively and expensively tuned and modified ADO15s, it was with these, rather than the standard 850, that we found ourselves mentally comparing the Cooperized Morris test car. In terms expressible in figures, the Cooper, as we'll call it for verbal economy, doesn't outperform the *most* extensively and expensively made-over 850s, but the manner of its going puts it in a class by itself. Both within and well beyond the 850's useful rev range, this enlarged engine does its work with a smoothness that's uncharacteristic of a small four with a high specific output. The first time we drove it—which was before we'd culled the background story from BMC's Alec Issigonis—our guess was that its crank had been balanced to or approaching racing standards. The credit, or blame, for this false impression belongs, as it transpired, to the new crankshaft damper, effect of which is closer to a transformation than just an improvement.

Encouraged by a BMC reference to an "ability to rev at *over* 6000 rpm" (our italics), we repeatedly took this boast at face value and explored 6000-plus in second and third gears, never with any perceptible onset of vibration or other symptom that bursting point was nigh. Indirectly, though, such eager revability does involve a risk inasmuch as the Cooper, disappointingly, has no rev counter, so a ruthless or insensitive driver lacks a visual reminder of the peak's whereabouts.

The ADO50 develops maximum torque at 3600 rpm, 600 revs further up the hill than the 850, so to get the best out of the larger engine you need to use a different technique. Upshifts are made later, downshifts earlier, and revs all the time maintained at higher levels. This, if they'd kept the old raspberry-cane gear stalk, would have been a pretty irksome process, but the new remote-control shift makes it a pleasure. You don't have to reach for it—it comes to you. You don't have to humor and persuade it—it just snicks through the pattern at a light touch. The synchromesh *per se*, on the other hand, was ripe for improvement and they haven't improved it. Maybe that'll come later.

In terms of serious, long-distance driving with no time to waste, you can sum up the Cooper by saying it'll cruise unprotestingly at eighty, six per hour above a good 850's maximum; closely approach ninety with only slight help

(Continued on page 82)

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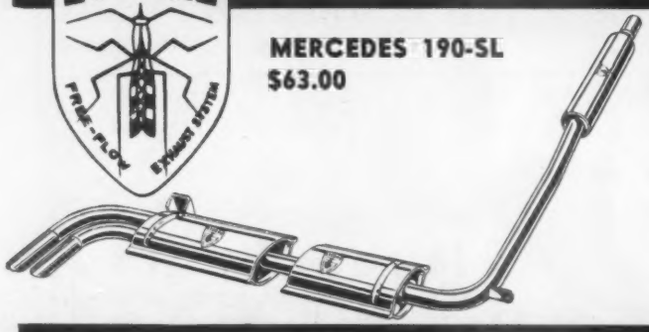

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Asks

Marion Weber

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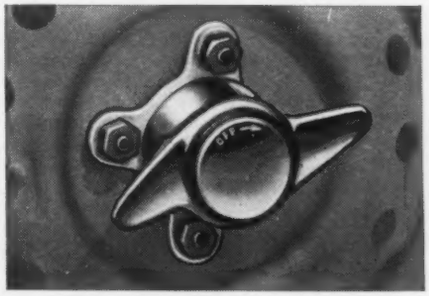

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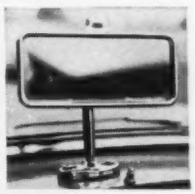

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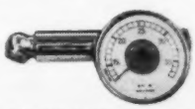

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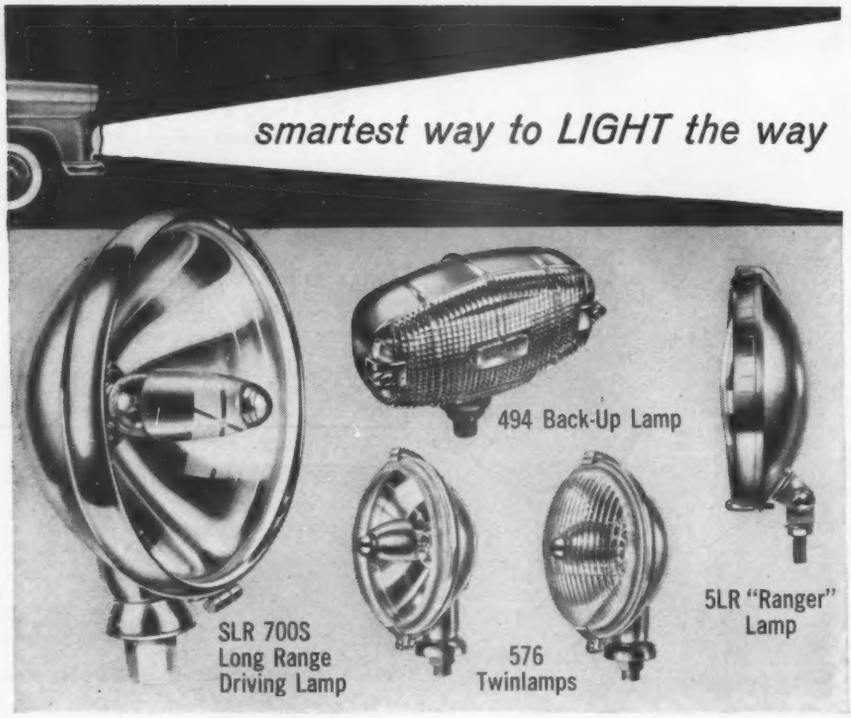

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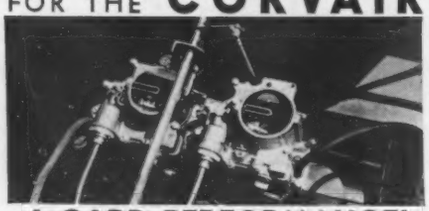

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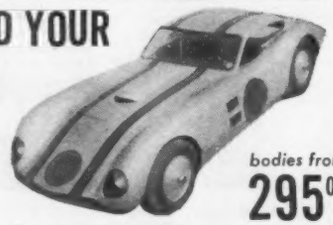

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(Continued from page 80)

from wind or gradient, without giving an impression of undue stress; pull out a true seventy in third when you need it for passing or hillclimbing, or if you just happen to enjoy the exuberant noise that seventy in third makes.

Surprisingly the Cooper's unobstructed exhaust system, although naturally a bit noisier than the 850's smaller-bore, baffled and more angular plumbing, doesn't produce the rasping, sports car note that in a small sedan adds insidiously to fatigue on long trips. Also general resonances, both from the engine/transmission quarter and the road via the wheels, are much subdued by the Cooper's wholesale treatment with sound-deadening material. This is BMC's equivalent to the deal marketed in Britain and elsewhere under the name Interior Silent Travel; the quilting is applied, among other places, to the inner surfaces of the hood, trunk, roof and floors.

For reasons that aren't obvious, the Cooper is around one hundred pounds lighter than the 850, but its greatly superior performance is cast-iron justification for the use of disc brakes at the front. It's hard to fault the braking system as a whole, its behavior being ten-tenths uniform in dry and wet conditions. Reserves of stopping power relative to vehicle weight and speed potential are enormous, and a BMC calculation, which we've no reason to doubt, says "when crash-stopped from 90 mph the new model taxes its braking system no more than a 60 mph stop would on the basic 850." Pedal travel is short, response instant without being fierce, and wheel locking very difficult to provoke. Under the roughest treatment we could devise for these Lockheeds, they never faded even fractionally.

In spite of the extra power and torque it has to handle, the Cooper's clutch is the same in all respects as the parent model's, and seems well up to its work at that. The test car's clutch made no protest when let in with a bang, over and over again, during standing-start acceleration timings, its rate of take-up being the same after this ordeal as before.

The Cooper departs from 850 specification in several nonmechanical departments, visible recognition points including a distinctive range of two-color paint jobs, a new chromed grille, and a front bumper with curved tubular reinforcers running from the tops of the overriders to the outboard ends of the main bar. Inside, the front seats are of shallow bucket type, to the benefit of one's personal stability when cornering vigorously. The trailing edges of the projections above and below the full-width dash shelf have protective padding (which could be thicker with advantage) covered in non-reflecting black material. An enlarged and oval-shaped instrument panel contains an oil pressure gauge and water thermometer as well as the central 850-type speedometer with combined fuel contents gauge. And there are lever-pattern door catches in place of pull-down release cords. Interior trim is new, many surfaces that previously were painted—including the inside of the doors—now being cladded in Vinyl-treated fabric. Several of these features are also common to new de luxe editions of the Austin and Morris 850 that BMC is introducing.

—Dennis May

ROAD RESEARCH REPORT: MORGAN 4/4 SERIES III

Continued from page 70

the speedometer become harder to carve and a long flat stretch of road is a prerequisite. Once accelerated, virtually any speed up to the maximum can be held for as long as road conditions permit in view of the light loading on the oversquare engine.

The 4/4 has one of the nicest interiors we've seen in a car regardless of its price. The doors, transmission tunnel and frame side members are covered with leather. Our car was a gloss black and had cherry red upholstery, a good combination and a wise choice for the exterior if you are prone to collecting chipped paint since there's no matching problem for touching up. The floor and the forward section of the frame rails are sensibly covered with ribbed rubber. The workmanship of the interior trimmings and exterior of the car were outstanding.

The leather seats are unique though they've been a Morgan fixture for years. They have a one-piece back which has adjustment for a small amount of rake. The seating position is nearly perpendicular and the big Bluemels Brooklands wheel sticks out at right angles to the walnut dashboard so the appearance of the driver behind the wheel is like a Grand Prix Kilroy. The seat cushions are merely leather containing air bags which can be inflated for the desired amount of softness. All of the pedals are of the pendant variety with heel-and-toeing the brake and accelerator a matter of shoe size.

The dashboard, as can be seen from the diagram, lacks a tachometer and a water temperature gauge but has both an ammeter and ignition warning light. The horn button is convenient to the steering wheel. Toggle switches on the central "console" replace pull-types used on the Series II. The factory informed us a tachometer will be available soon. Even the arch-conservative Morgan now starts on the key (hear that, BMC?).

Some amount of body shake, particularly the doors, is visible as the frame racks over rough surfaces. The doors open fairly wide but getting in and out gracefully is hampered by the step-down seating and the steering wheel. The low-cut profile gives a convenient arm rest although on chilly days with the side curtains off the wind gives a kidney punch. The driving position is quite low so the low windshield does a good job of wind protection. The wipers have only one speed and it's not fast enough for a heavy rain.

The car looks best with its top down, although the 4/4 does not have the top-up ungainliness that Morgan Plus 4 4-seaters have. The top itself is plasticized cloth, completely removable from the ribs. The fabric snaps onto the upper edge of the windshield and has no gasketing. Snaps are also used for the rear attachment. The framework is hinged at each side and collapses out of sight. Putting the top up is best done with two people. Rear quarter vision is restricted by the lack of windows such as those on the MG TD. Luggage space is in the classic sports car manner. the sole compart-

Continued on page 84

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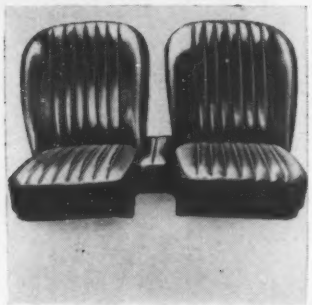

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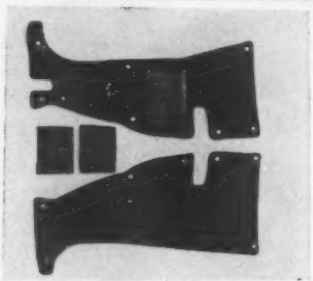

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(Continued from page 83)

ment being the well behind the seats and that is quite narrow and not very deep. A luggage rack is a Morgan accessory.

In testing the Series II we called Morgan the "staunchest guardian of the vintage look, ride and feel." This is true too of the Series III and a further vintage virtue it maintains is construction. Of the car's total weight, for example, some 45 pounds are wood. This oldest (and very versatile) body-making material is used for framing the doors and constructing the rear wheel wells as well as the floorboards and platforms for the seat cushions. Another contribution to the vintage aspect is its front suspension. Nominally independent, it was first used by H.F.S. Morgan, founder of the firm, as early as 1909 (in prototype form). It consists of a coil spring wrapped around a vertical bar on which the stub axle can slide up and down. A tubular shock absorber mounted vertically forward of the sliding unit is used on each wheel. The sliding axle is lubricated by pressing a toe button on the middle of the firewall, just over the transmission tunnel. The factory recommends this "one-shot" lube at least every 200 miles. Holding the plunger down for a few seconds permits some engine oil to flow to the suspension's working parts and a slight drop in oil pressure is noticeable while the button is down. In addition, however, the axles have grease nipples to be lubricated every 3000 miles, the grease is said to be helpful in retaining the oil supplied by the one-shot system.

Morgan is a great believer in the tenet that lubrication is cheaper than overhaul and is very specific in its instructions stressing the importance of preventive maintenance. It encourages drivers to do their own maintenance, giving a very complete owner's manual but for those who are not so inclined the neighborhood Morgan or English Ford dealer should have a full supply of parts and factory-trained mechanics. Morgan stresses three points in ownership. The first two are regular lubrication and keeping brakes adjusted properly. The third is "the necessity of keeping nuts, bolts and screws tight." An honest car, the Morgan's components are easy to reach and aren't mysterious.

Some 4/4 owners may find they want more power. The stamina of the 105E engine has been amply demonstrated in its rapid acceptance by Formula Junior builders. From its initial modest 39 bhp it can be transformed into a fire-breathing 85 bhp tiger.

The simplest step is to order your Morgan with the factory Competition Kit (probably Aquaplane components) which includes an aluminum cylinder head, new intake and exhaust manifolds, two S.U. carburetors, heavy duty valve springs and a tachometer. The price, installed on new cars, is $200.

This could be in conjunction with the $80 kit for front wheel disc brakes which boost the swept area from 141 to 325 square inches, although we should note that the stock brakes seemed well-suited to their job. A third performance option for serious drivers would be the heavy-duty front suspension kit at $35.

Another option on new cars that is not available at this time in the United States, is to order your car with a supercharger. This can presently be done in England. The supercharger is a Shorrock eccentric-rotor, vane-type blower which mounts on the left side of the

(Continued on Page 86)

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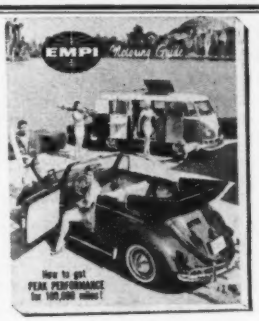

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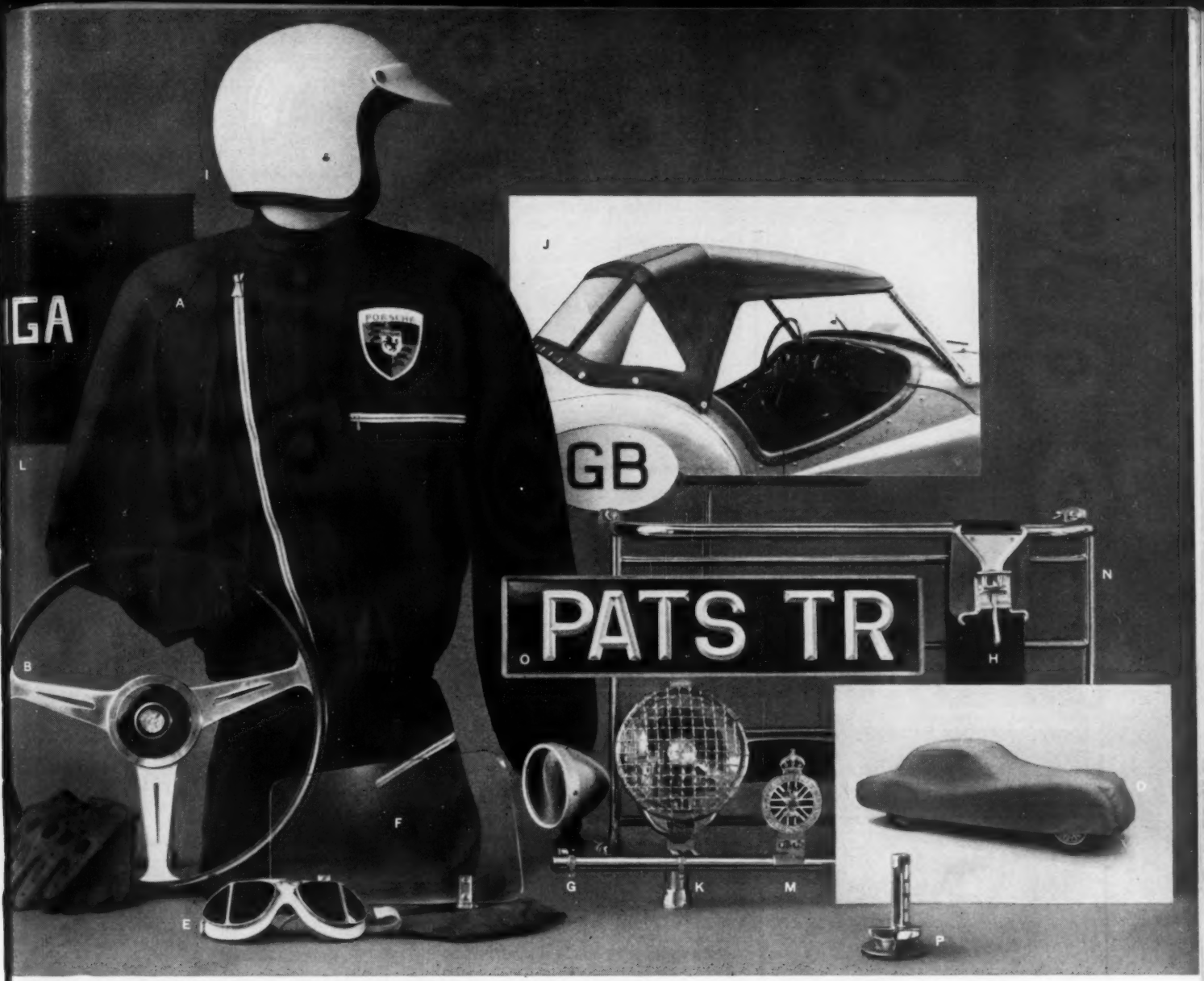

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THE ART CENTER SCHOOL

(Continued from page 84)

engine just above the generator. Available from the Allard Motor Co., Ltd., 24-28 Clapham High Street, London S.W.4, England (there is no U.S. agent at this writing), it's priced at about $210 not including shipping, taxes, etc.

Driven by a single vee-belt, the blower uses a single 1½-inch S.U. carb which comes in the kit. It is lubricated with engine oil and is driven at engine speed. It develops a maximum boost of 6.5 psi according to Allard. They say bench testing of the blown engine shows power is increased 56.4 percent to 61 bhp at 5000 rpm. At 5500 rpm, 63 bhp is produced while at 3200 rpm, no less than 37 bhp is developed. Figures in an AUTOCAR test on a blown Anglia said pulling power in lower gears was improved and the top speed went from 79 to 91 mph. It's logical to conclude the benefits of supercharging would be multiplied in the lighter Morgan.

Another way to more go is to install a rebuilt engine. The advantages of this over the supercharger route are that you can end up with exactly the degree of power you want and, by buying components, you can do as much as you can afford at a given time. A photo representing the possible results shows the Lawrencetune engine available from Westerham Motors Ltd., 69a Avenue Road, Acton, London, W.3., England, whose engines are from $490 up.

Cosworth Engineering Ltd., Florence Road, London N.18 is one source of rebuilt engines and equipment. According to W. Brown, the general manager, their main concern is producing engines for F. Jr. cars but they do sell them for other uses too. Two variants are available, the "75" and the "85" bhp units,

FERRARIS FLY NOSE-DOWN

Continued from page 27

missed a Ferrari) and the car caught fire. Stopping just in time, Ireland feverishly sought a fire extinguisher from someone but was unsuccessful and he was forced to watch the car burn completely to the ground.

At the end of five laps or one-third the distance, Moss was still leading, Hill second, Trips third and Jim Clark fourth. Two Porsches were in trouble by then—Herrmann's engine was smoking as was Bonnier's. The latter had been held up in the beginning by a damaged tire, but the writing was on the wall and both were soon out of action. This left only Dan Gurney to uphold Porsche honor. At half distance he was lying seventh, again battling gamely with Bruce McLaren—as he did at Aintree.

By half distance, Trips began to close on Hill—both of them in hot but vain pursuit of Moss. On lap eight Trips turned a 9:01.6—on the next lap a 9:01.1. Phil Hill then established fastest time of the day on the tenth lap with an 8:57.8. Trips and Hill were side by side duelling for the second place spot as the two red Ferraris roared up the back straightaway behind the pits, 9.5 seconds behind Moss. But the Ferrari drivers were taking a brutal physical beating from their cars. First, Hill's stuck in second gear and he motored for half a lap at 10,000 rpm, struggling to get into a higher gear. It was here that Trips overtook him. Richie Ginther was having such a struggle just to keep up with Mairesse's Ferrari that he flew out of the Karussel once when his gearshift disengaged. From then on, Richie let Mairesse charge ahead (he eventually left the road on the last lap). This was the first race of the year when all Ferrari drivers finished with blistered hands! The uphill portion of the circuit at half distance was particularly rough on Hill—his car was bottoming terrifically and he feared chassis breakage. It was here he remarked "Ferraris fly nose-down," for he was actually off the ground numerous times.

Drama on the last lap: Moss, safely leading by some 15 seconds, crossed the line just as a terrific rainstorm enveloped the start and finish area. Hill led Trips out of the Karussel and the two of them roared onto the back straight. Trips's car with a slightly lower rear axle ratio was getting a few hundred more revs on the straight and he slowed to tuck in behind Phil so that he could nip out of the slip stream and be first across the finish line but Hill slowed as well and the two of them drove up the straight side by side—looking at each other. Surprisingly, as they reached the crest of the hill at Antonius bridge, the two Ferraris ran into a wall of water that put them both virtually sideways—not seeing anything and completely out of control. Somehow both emerged unscathed but Trips was in the lead and he shot across the finish line exactly one second ahead of Hill. For Phil Hill rooters it was another sad day to see him robbed of championship points after such a splendid demonstration both in practice and in the race.

WORLD CHAMPIONSHIP

1.	von Trips	33 points
2.	Phil Hill	29 "
3.	Stirling Moss	21 "
4.	Richie Ginther	16 "
5.	Jim Clark	12 "
6.	Dan Gurney	9 "
6.	G. Baghetti	9 "
8.	John Surtees	2 "
9.	Bruce McLaren	1 "

Race post-mortems brought up one interesting point; i.e., Ferraris were practically the only cars without rain tires fitted in the race. Brabham chose to fit them to the front of his Cooper while Moss had them all 'round. Minutes before the start, the Ferrari mechanics, on the advice of Dunlop, rushed about madly to remove the rain tires as the circuit was rapidly drying and the clouds disappearing. The rain tires definitely offer better roadholding—even in the dry—but they wear quicker and this thought caused Ferrari last-minute panic after being advised by Dunlops that they had better remove them. The fact that Moss had an edge on roadholding—plus the fact that the Ferraris were virtual monsters to drive this time—and, of course, that all-important fact that Stirling Moss is Stirling Moss, explains his walkover victory. He earned it, but nevertheless had to work hard that Sunday; Stirling was spent at the end. More than the Nürburgring has seen in many a year—300,000 spectators—watched his feat, somewhat overshadowed by the close battle for second place between Trips and Hill in fighting it out for the title of World Champion. —*JLA*

priced at about $785 and $925, respectively, f.o.b. the factory. Mr. Brown said the "75" units are currently producing "more than 80 bhp at 7000 rpm and are more tractable than the more powerful engine." The compression ratio is about 10 to one in both engines.

Both the "75" and "85" engines are fully balanced and the maximum power is guaranteed to at least equal the nominal listing through dynamometer testing before the engines are shipped. Both used special pistons, lead-indium main and rod bearings, oversize intake valves, heavy-duty exhaust valves, heavy-duty springs, and two Weber carbs.

Another source for engines and equipment is G.S.M. Cars Ltd., makers of the G.S.M. Delta. Fine Cars, Inc., 152-154 West 56th Street, New York 19, N.Y., is the distributor. Among their offerings are these engine assemblies which include transmission, carburetors, exhaust header, starter and generator: 60 bhp with standard gear box, $755; 60 bhp with close-ratio box, $930; 75 bhp with close-ratio box, $1315 and 86 bhp with close-ratio box, $1835. Among the individual items available from Fine Cars are: intake manifold for Weber dual-throat carb, $45; Weber carb, $84; exhaust header set, $60; T3 camshaft, $50; air cleaner for Weber carburetor, $17. The firm also sells a laminated steering wheel for $55.

G.S.M. offers three stages of tune on the 105E engine. The first consists of mounting the special intake and exhaust manifolds, and the related items. Stage II features the addition of heavy-duty valve springs and the camshaft. Stage III includes all of the above plus a high-compression head and bigger intake valves.

A further source of supply for some speed equipment for the 105E is Tec Auto, 198 Glen Street, Natick, Massachusetts. Among the items currently available are the Speedwell "full-flow" four-branch exhaust manifold and Servais mufflers. The prices, including shipping, are $49.95 and $22.95.

The Aquaplane Company, Ltd., Oulton Broad, Suffolk, England supplies many hop-up items that can be bought in kits or as separate units. As we mentioned, we believe this firm supplies the equipment for the factory-installed competition kit although up to our deadline for this Road Research Report we had not seen one. Aquaplane was the supplier of equipment for the hopped-up Series II we tested.

Among their equipment, with approximate prices f.o.b. the factory, are an intake manifold with two S.U. carburetors, pipes and linkage (NA/900/2SUK) $63 and air cleaners for the above (NA/AF250/SU), $2.80 each. A less expensive dual manifold is their NA/900/-SOL/K which comes with one Solex carburetor, to match the stock unit and includes pipes and linkage, priced at $45.64. Air cleaners (NA/AF/250/SOL) are $2.80 each.

A racing alloy flywheel (NA/1000/R) is priced at $32 and weighs about one-half as much as the stock iron unit. One with a steel face (NA/1000/R/SF) for greater durability costs $35.

The NA/1400 exhaust manifold is recommended for use with either of the dual intake manifolds. Of a free-flow design, it's priced at about $25. Contributing nothing in the way of power but useful for prolonging engine life and reliability, the oil cooler kit may be

(Continued on page 88)

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(Continued from page 87)

considered. Priced at about $33, its part number is NA/3000/OC/FF.

Heavy duty exhaust valves (NA/-KE965) are priced at $14 per set. Similar intake valves (NA/INLET) go for about $5.80 per set. Oversize exhaust valves (NA/KE965/OV) are about $15 per set while heavy duty valve springs (NA/825/R) are about $6.30 per set.

Aquaplane's finned alloy valve cover (NA/SPEC/5) is priced at $11.50 and the electronic tachometer (NA/1500/-ELEC) lists at $37.80. According to our most recent price list, the Aquaplane Alloy Superhead (NA/6000/S) was to be available shortly. We believe this is the head that is available on the 4/4 but we have no price on it.

In lieu of Morgan taking the initiative (and we wouldn't be at all surprised if they will), we offer this suggestion. Swap the existing 105E engine for one of the new 109E engines used in the just-announced Ford Consul Classic 315. It's essentially a stroked Anglia mill.

Displacing 1340 cc, it has an 8.5 to one compression ratio and develops 56.5 bhp at 4900 rpm in stock form, equal to the output of many 1500 cc sedans. The 109E uses the same block as the 105E. Its bore is identical but the stroke is increased from 1.90 to 2.562 inches. A different cylinder head is used, having deeper combustion chambers for the larger displacement. Valves and springs are the same, but the pushrods are longer. The pistons in each are identical and the extra length of the crankshaft throws has been accomplished by shortening the con rod centers. Slight changes were made in the intake and exhaust manifolds, but not in the port sizes.

The gearbox used with the 109E is the same as the Anglia's (and, of course, the Morgan's). To take the added power of the bigger engine, you'd do well to install the Classic's heavier-duty clutch which is the same diameter as the Anglia's but has stronger springs. Alternate rear-end ratios, according to Morgan, will be available for the Anglia-engined 4/4 and one or more of these should be useful if you go to the 109E engine.

Rather than buying a complete 109E (and that could be quite difficult since, at present, there are none available in the U.S.) you could possibly "modify" your 105E engine to its specifications. Reportedly development of the two engines was carried on simultaneously by EnFo with the beef needed for the larger being built in from scratch. Consequently if you could get the bigger engine it should be a sound basis for further power probes with something over 100 bhp within the reach of a skilled mechanic.

The 4/4 should be a wise choice for a sports car. Its price is not cheap, but neither is its finish and you are buying a certain degree of exclusiveness, much more than you buy with one of the mass-produced *bolides*. The simplicity of its mechanical components should encourage home maintenance yet the car isn't fussy so that it doesn't have to be a "full-time hobby." Its operating expenses should be low and world-wide Ford service should set an owner's mind at ease once that fateful day comes when it does need major work. Its desirability among enthusiasts should keep its resale value relatively high.

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(Continued from page 10)

SUPERIORITY OF BRACED-TREAD TIRES

What's all this recurrent nonsense about Michelin X tires breaking loose suddenly and without warning? Your latest "toot" on this theme came on page 68 of the July issue on the Fiat-Abarth road test (a fine write-up, incidentally).

Has anybody come up with any curves or graphs of tire behavior showing side thrust plotted against "stuck" and "unstuck" conditions? In other words, what does side thrust look like during the transition period from static to dynamic friction? Such a set of curves would be interesting indeed.

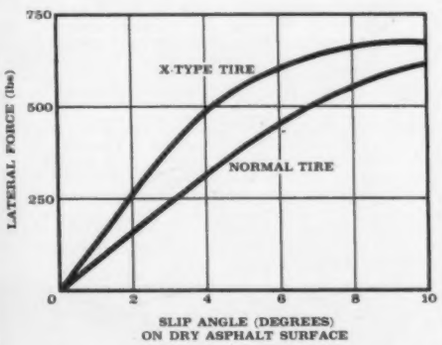
Maybe I'm too stupid to know any better, or my driving is on the "old maid" level and I haven't got the message. At any rate, I've used nothing but X's on two Porsches now and find they absolutely transform any automobile. I've also "kicked around" a few "D" Citroëns equipped with X's and have no reason to change my views—in short, for my money, X's are nothing short of fantastic for fast highway motoring.

They stick like glue on dry roads, in snow, although in the rain I find you have to stay awake. But perhaps every other tire gets a bit touchy in the wet. They wear like iron, they seem quite insensitive to rather wide variations in pressure, and above all they are quiet. This last is a nice feature in the States, for as you know, nothing wakes up the gendarmes quite so quickly as the combination of a red sports car and chirping tires—even if you are doing 11½ mph.

So, can we get a little objective clarification of Michelin X behavior when going from "stuck" to "unstuck"?

John A. Moody
Cologne-Marienburg, Germany

Thank you for taking a very controversial question up for debate in these columns. The very high cornering power of the Michelin X tire is due, as you no doubt know, to the metallic bracing of the tread, which ensures negligible directional deformation of the tread contact area in spite of an extreme flexibility in the sidewalls. In other words, at side forces experienced in normal or even high-speed road motoring, the X tire has a smaller slip angle than a normal tire. As lateral pressure rises, the slip angle of the X tire increases proportionally more than that of the normal tire. This graph illustrates the point:



In practice, you will notice that a drift builds up very slowly, but from a near-maximum controllable drift, the point where the tire lets go altogether is reached practically without warning, as indicated by the near-horizontal portion of the curve. Fortunately, this limit is never reached by most drivers, and we hope you will continue to enjoy your drifts as before.

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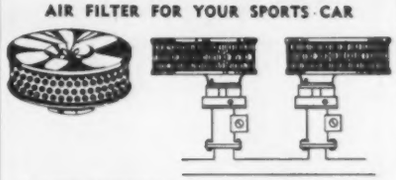

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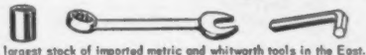
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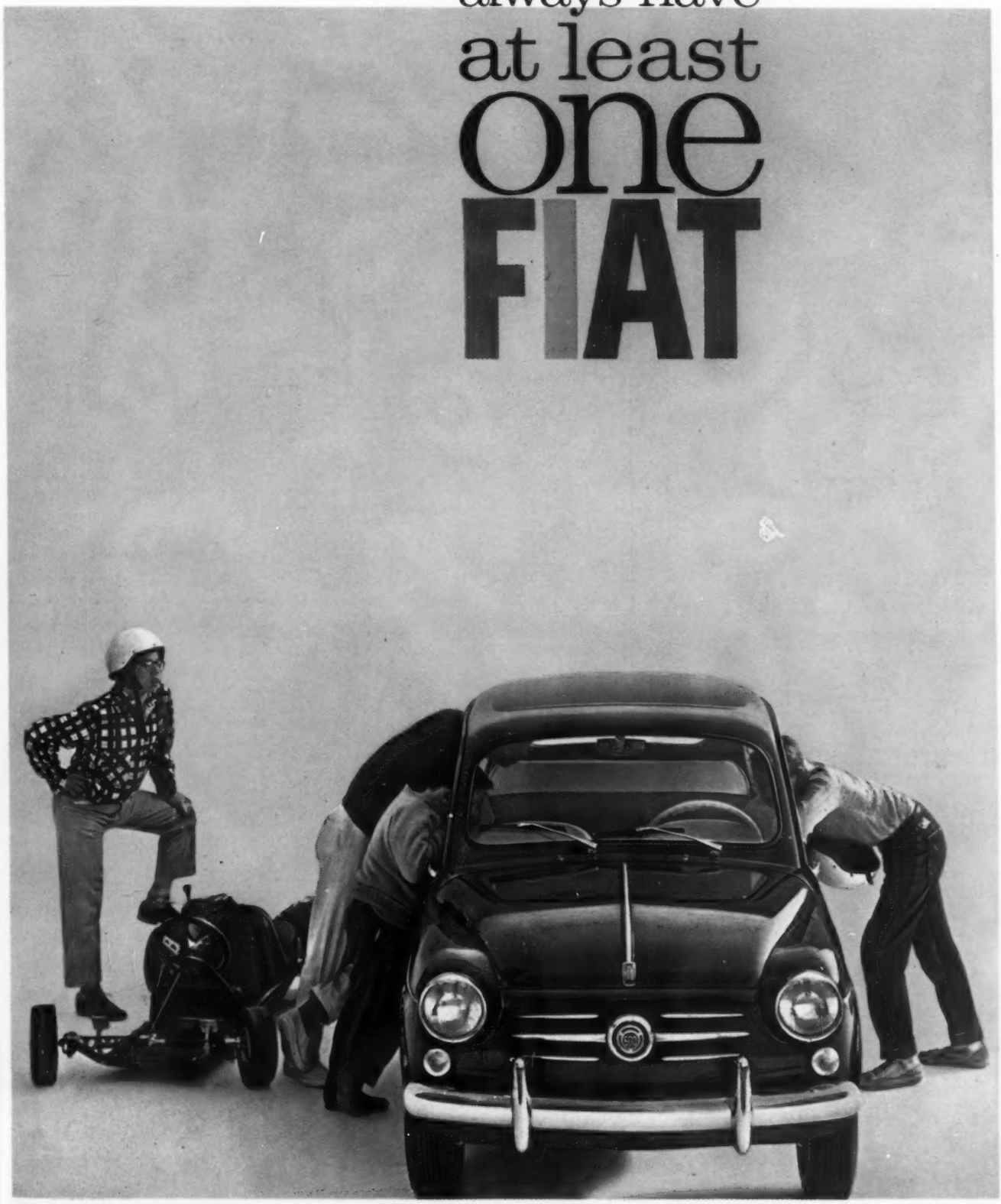

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